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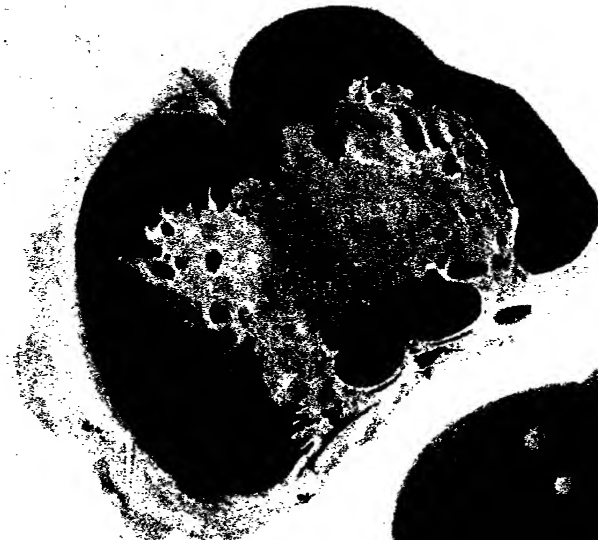

FIG. 2.

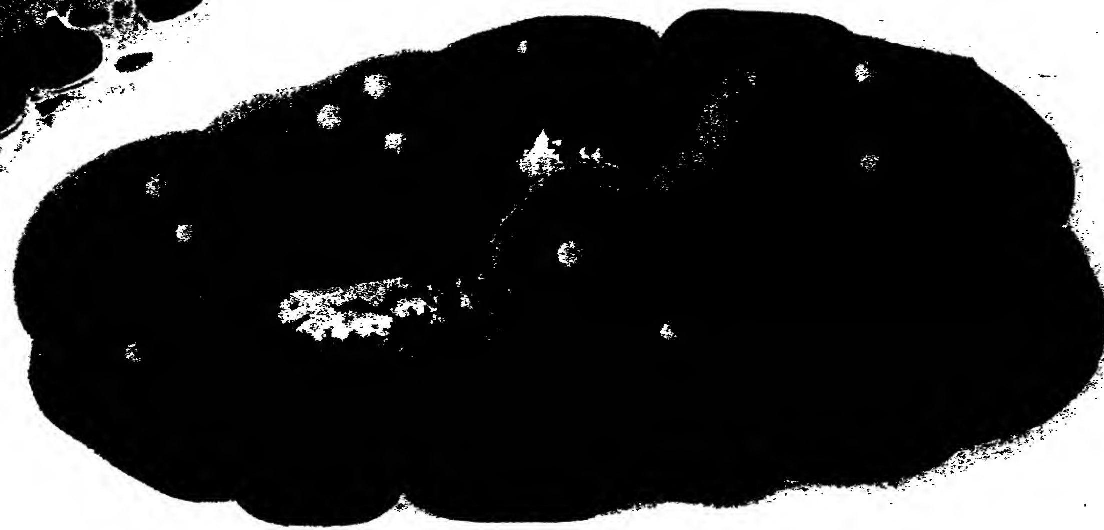

FIG. 1.

Fig. 1.—Kidney from case of East Coast Fever, showing the area of Necrosis (Infarcts) in various stages.

(See p. 11.)

Fig. 2.—Sub-Maxillary, Lymphatic Gland from same case, showing the areas of Hæmorrhage and general inflammation of the Gland.

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Koodoos and Elands and East Coast Fever.

Dr. Theiler's article on Ticks and Cattle Diseases in the May issue of the *Agricultural Journal* reminds Mr. B. van der Meulen, of Richmond, P.O. Koonap, Fort Beaufort, Cape Province, that while rinderpest was prevalent several koodoo were found dead and the cause was attributed to that disease. He asks, as a consequence, is the koodoo immune or resistant to East Coast fever? On this being referred to Dr. Theiler he informs us that no information is to hand as to the susceptibility of the koodoo to East Coast fever, and it is quite true that these animals succumbed to rinderpest. As regards the susceptibility of game generally to East Coast fever, only one instance is known. That was in German East Africa, where a sick eland was shot and microscopical examination of its blood revealed the presence of East Coast fever parasites. On the other hand, experience in Natal, where elands have been exposed for a considerable length of time to infection, shows that all elands are not susceptible to the disease. This is a very interesting point, and it would be as well if some of our many correspondents could gather a little information on the subject.

The Maize Industry.

As the maize industry of South Africa advances, the crucial question of local consumption *versus* export is gradually coming to the tront with more and more force. That consumption on the farm pays best, only provided that the article so manufactured is properly marketed, needs no demonstration. The only point likely to give rise to question is where the average mealie grower is to procure stock to consume his crops. As a rule the man who grows the export maize is not in a very strong financial position, and in this respect the export trade is doing good, for it provides the poor man with an outlet for surplus grain and thus brings to him a little much-needed capital. The wise man is he who takes heed by the examples offered around, and does his best to secure stock of the right class to consume as much of his crop as possible. An instance was recently cited in the Johannesburg *Leader* of a farmer who had fed a large proportion of his maize crop to pigs instead of exporting. The result was that he obtained 4d. per lb. live weight, and this made the value of his mealies come out at 30s. per bag instead of the 8s. to 8s. 6d. he formerly received in the European markets. Such a return is excellent, of course, but it would soon diminish if every grower did the same. What is badly needed now in South Africa is a thorough

scheme of organization among the farmers themselves for the introduction of better methods of marketing their products. With an example like the above there is a danger of a plethora of pork, but with the addition of well organized bacon factories dotted about the country we could proceed on our way with little fear. The magnificent maize crop of South Africa will never bring its rightful return until the country as a whole embarks on an industrial policy of dairying and pig production with a command of the European markets for the surplusage.

Stock Diseases and Tick Eradication.

There is a good deal of matter in this issue which deals with what may well be looked upon as the war against the tick. As the great pest and scourge of the cattle industry of South Africa, it is high time that this campaign was not only begun but pursued with energy and unrelenting fury until the enemy is subjugated. It seems too much to hope that we shall ever entirely banish the tick from our pasture lands, but there is no reason at all why the ravages of tick-transmitted diseases should not be brought under control. For the moment the only effective weapon against the tick is cattle dipping, and there is sufficient information in this issue upon which to organize a campaign which might be carried to the verge of extermination. This country has now before it the results of almost every form of attack which, so far, has been devised, and as several of these are proving effective there is little excuse for delay. The only points for the cattle farmers to settle for themselves are those which apply to local conditions. The main consideration for the farmer is to adopt that system which promises to work best in the circumstances in which he is placed, and the phrase "to work best" will always have to be construed to mean that which is most likely to kill off the maximum number of ticks. It has been demonstrated that it is possible to clear off large numbers of ticks and thus reduce to a neglectable quantity the possibility of infection with East Coast fever. But the major point to keep in view is that dipping at regular intervals not only keeps ticks down but prevents the onset of other diseases and very considerably improves the average condition of the stock. It is therefore well for all farmers interested in cattle to carefully consider as a commercial proposition, a profit-earning proposition, as well as a sanitary precaution, the construction of dipping tanks for their stock. The next precaution to take would be the regular and systematic dipping under skilled supervision, and in this case there is no supervision like that of the farmer himself.

Fertilizers and Fertilizing.

Although the article in the current issue by Dr. Perold, the Government Viticulturist (Cape), on Manuring applies almost entirely to that subject as it affects the vineyards of the Western Province, there is a great deal in it which agriculturists generally should carefully study. The general principles laid down are based on very sound investigations, and as these, among other things, point to what should be avoided as much as to what course should be followed, there is much food for reflection. One point is emphasized which should be taken to heart by all practical agriculturists, and that is to avoid

placing too much reliance upon chemical analysis of soils. This, to many, may appear a strange doctrine to preach, but the fact remains that chemical analysis of soil, by itself, can in no case ever be taken as completely final. The value of analysis—and if carried out on modern lines it is very valuable indeed—begins and ends with the deductions which may be intelligently made from the results. It is in no sense final so far as the agricultural productivity of the soil is concerned; and to be made complete and of full value should always be followed by careful experimentation. Chemical analysis may prove very disappointing otherwise. The experienced farmer who asks for soil analysis for practical purposes will at once follow up the results by a series of experiments with the crops which may be indicated as likely to succeed. But he should not be disappointed should the return not equal his anticipations. Even a soil richly endowed with plant food and every prospect of giving profitable results cannot always be made to give exactly the return desired on the first attempts at cultivation. In fact a poorer soil may be found to give better results at times. The causes of these differences are not always easily traceable, but they are usually to be found in the varying farming practices adopted, the mechanical condition of the soil, and other physical features. The soil alone can give the exact information wanted and solve the puzzling problem, and the only reliable method of obtaining this reliable information is to put questions to the soil in an intelligent manner by means of a series of well-planned experiments. Whether fertility has to be restored or new crops tested, the best course is intelligent experimentation, and every farmer should learn to do this for himself.

Sterilized Bone Meal.

The attention of stock-owners in the Cape Province is directed to the fact that although all bone meals intended for cattle feeds must be registered with the Department of Agriculture, Capetown, in accordance with the provisions of the Fertilizers, Farm Foods, Seeds, and Pest Remedies Act, No. 20 of 1907 (Cape), and that only such bone meals as have been thoroughly sterilized during the process of manufacture can be registered and sold as a farm food, yet bone meals are frequently imported and sold as *fertilizers*, and, consequently, do not require to have undergone such sterilization. Stock-owners, therefore, in order to obviate any risk of introducing disease to their stock through the medium of bone meal, should take the precaution of buying, for cattle feeding purposes, only such bone meals as have been registered as *cattle feeds* and not as fertilizers, and should insist on being furnished by the seller with the figures showing the guaranteed composition in terms of the Act above mentioned.

Laying out an Orchard.

Mr. E. Pillans, Horticulturist (Cape), offers the following comments on Mr. A. E. Jones' notes in the issue of April:—"I would like to add a few words as to the surveying devices which go to make up correct laying out. The simple method of staking two corners and putting in a few sticks for sighting scarcely needs description. A correct line down one side of the area is thus obtained.

The difficulty is to lay off a true right angle for the breadth measure. Then from the starting point measure along the other side 63 feet, drawing the tape as nearly as possible at a right angle, judging by the eye, and put in a mark. Now, if the angle so made is a true right angle, you will find that the diagonal or cross-line measure from mark to mark and completing the triangle will give you exactly 100 feet. If less, the 60-feet mark has been taken in too far; if it is more, then you have splayed it too far out, and in either case correction must be made until the 100 feet diagonal measures up correctly. Having thus got the true corner, the lines can be continued by the common method of sighting with upright sticks."

Lantern Traps for Codling Moth.

Mr. C. P. van der Merwe, Assistant Biologist, Orange Free State, writes:—"Last year a paragraph went the round of the South African papers to the effect that a New Zealand orchardist had been very successful in controlling codling moth by means of lantern traps. As this is a method which has been repeatedly proved to be of no value whatever, I wrote to the New Zealand Agricultural Department for information on the case reported and I enclose a copy of the reply received." As some people were mislead into adopting this worthless remedy instead of spraying, the following extracts from the letter in question should be of interest:—

"The following is a report received from our Orchard Instructor concerning the work done by these traps:—'I beg to report having watched carefully the attempts made by Mr. C. Burch, of Papawai, to eradicate or control codling moth by means of kerosene lamps floating in water. Although much has been made of this matter, I have never been able to see sufficient good accomplished to make it worth while reporting to the Department. I have frequently examined the traps and have found in them a large number of moths and insects of all kinds, and among them a few codling moth, but not enough to cause one to wax enthusiastic, especially as the orchard is always more or less troubled with codling moth. It is an old-fashioned place and the methods in vogue are very much behind the times. I regard the whole thing as a farce, and consider its publication will do harm to unsuspecting people who read it.'"

Branding Wool Bales for the Market.

Mr. Chas. Mallinson, Flockmaster and Wool Expert (Transvaal), writes:—As some misunderstanding seems to exist amongst farmers as to the real object for which wool bales are being marked, I offer no excuse for sending these notes. My intention is to throw more light on the subject than I gave in my lecture at Dullstroom, as reported on page 191 of the *Agricultural Journal*, Vol. I, No. 2, of March, 1911. The principal part of that lecture was devoted to the more important subject of breeding good sheep, whilst only a few remarks were made as to the get-up of wool for the market and the branding of bales. Only recently a letter from a farmer of the Winburg District, Orange Free State, was forwarded to me for my remarks, which is a clear proof that I am right. The letter reads as follows:—"On page 192 of the *Agricultural Journal* for March, 1911,

Mr. C. Mallinson, Wool Expert, Transvaal, speaks of the classification of wool, and says that 'first class' fleeces must be marked 'AA' and second class with only one 'A', whilst Mr. McNab, Wool Expert for the Orange Free State, teaches us in the Free State to mark first class fleeces 'A' and second class 'AA'. Now, sir, can you tell us sheep farmers which is the right way?"

The Object of Branding Wool Bales.

It is hardly necessary to state here that Mr. McNab is perfectly within his rights, as would be any other woolman, to choose the distinctive marks which they wish to put on the different qualities of their wool and the manner of marking to distinguish the contents of the bales from each other. There is no hard and fast rule in existence according to which certain definite characters or marks should be used to define a specific quality of wool. The choice of this lies entirely with the owner or man entrusted with the get-up of the clip. The proper branding of the bales is of more importance than is generally considered. It not only goes a long way towards preventing mistakes during transit to market and when the wool is being taken into store or delivered after it is sold, but it also guides the buyer as to the contents of the bale and saves him a great deal of his time. The branding should be done distinctly, simply, and honestly, and giving as much information as possible. A still more important result is being obtained by the farmer who puts his pride in the get-up of his clip. His wool soon earns a good reputation on the market; his brand becomes known to buyers and, consequently, secures better competition and higher prices.

How to Brand.

Frequently the heading consists of (1) the name or distinguishing mark of the owner (2) with the name of the farm or district beneath it; (3) then follows the class of the wool and (4) the number of the bale. The brand should be put on one side of the bale, and on the end the owner's mark. Name of farm and number of bale as follows:

On the flat side of the bale:	On the end of the bale:
D. O. A.	D. O. A.
Ermelo.	Ermelo.
A A	1
Combing	
1	

In branding bales it will always be found advisable to use straightforward business terms such as "Super", "AA", or "A" Combing or Clothing, as the case may be, according to the class of wool it contains.

Of course there is no reason whatsoever why a farmer should not brand his wool "Firsts", "Seconds", "Thirds", "Fourths", etc., if he wishes to do so. What the buyer requires is evenly classed wool; using these brands, for instance, "AA Combing" or "Clothing", there is at once something definite and the buyer knows what to expect. Coming next he sees "A Combing" or "Clothing", which at once indicates that the wool is different to the "AA" quality. It need not necessarily be inferior, but only of a different

quality. If the word "Super" is marked on the bale it is sufficient information to give the buyer to understand that there is something better than in any of the other bales.

For the Small Farmer.

The above method of branding recommends itself more partioularly to the small farmer and the numerous small clips we have in South Africa. The classer is not always justified in making too many sorts on account of the smallness of the clip. He has to study the interests of the owner and practically only grade the fleeces in so many lots as would in his opinion benefit his principal. An injudicious description of these lots often leads to lessening the competition on the market. As a rule, pieces are generally branded "Firsts" and "Seconds", etc., as the case may be.

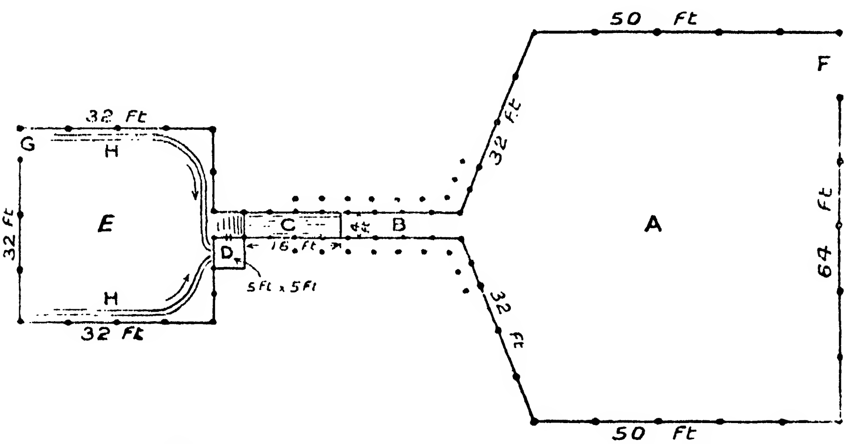
It should now, I hope, be distinctly clear to everybody that the letters or marks used for distinguishing the different qualities of wool are entirely dependent on the taste or fancy of the owner or man in charge of the get-up of the clip. There is absolutely nothing to prevent him, for instance, from branding his "Firsts" "ZZ" and his "Seconds" "Z", or vice versa, although this way of branding may not be common on the market. Whatever the mark may be with which the wool is branded, the agent or broker entrusted with the disposal of the wool should under all circumstances always receive a full specification of the clip as to the contents and marks of each bale. This will enable him to allot the clip to its best advantage and to give buyers a correct description on the catalogue. Before concluding, I wish to give farmers the only sound advice which will bring them to the top of the tree. Be thoroughly honest when you deal with wool matters. Always take care to mark every bale carefully as to its contents so as to earn the confidence of the buyer. Never consider it too big a trouble to press the bales, and brand them neatly and make them have a becoming appearance, as it will pay you every time to have a good reputation on the market. You will soon experience keener competition for your commodity, which means higher prices and more money in your pockets.

A Heavy Crop of Lucerne.

In 1902, F. S. Kirk, of Garfield County, Oklahoma, sowed a field near a creek, but about 25 feet above water, with thirty to thirty-five pounds of alfalfa (lucerne) seed per acre, broadcast. The soil, which he calls "high bottom", was a dark brown and contained considerable sand. For two years no attention was given to it except harvesting from it three crops the second year and four the third year. In 1905 he harvested from ten acres nine cuttings, estimated to weigh fully one and one-half tons each per acre. The longest time between any two cuttings was twenty-two days and the shortest fourteen days. During the season of 1904 seven cuttings were made and the field was gone over with a disk harrow early each time after removing the hay from the field. It was possible to cut another growth of 8 to 12 inches had he not preferred to use it as pasturage for stock.—From Coburn's "The Book of Alfalfa".

A Cheap Cattle-Dipping Tank.

The construction of tanks for the dipping of cattle with the object of killing ticks is of perennial interest, for the tick is undoubtedly the great enemy of our cattle industry. It is not only East Coast fever we have to contend against, and the time is rapidly coming when a dipping tank will be as much an essential part of the farm equipment where cattle are raised as the dipping tank is for the sheep run. A good many plans and schemes have been published from time to time, but that herewith, received from Mr. Chas. Maggs, of Kalkfontein, Waterberg, seems about the cheapest appliance of this nature which has come under public notice. The tank, of which a sketch is appended, was constructed on this farm, including the paddocks, for the sum of £52. 5s. 2d. The secret of this low cost seems to be that a site was found on the farm in a suitable position on a slightly



A—Crush Paddock. B—Crush. C—Dip. D—Settling Tank.
E—Draining Pen. F—Entrance. G—Exit. H—Drain.

The costs of above are given by Mr. Maggs as under:—White labour, £9. 2s. 6d.: native, £9; tram rails, £9. 18s.; standards, £5. 14s. 8d.; plain wire, £1 7s. 6d.; fuse, 12s. 6d.; dynamite, £5; detonators, £1 10s; drills, £2; piping, £1: cement, bolts, and other sundries, £2: manager's supervision, £5—total, £52. 5s. 2d.

sloping, flat rock surface. This enabled the work to be accomplished without cement concrete, excepting only for the making of rain-water furrows around the tank. The tank itself was blasted out of the rock; it is 16 ft. by 4 ft., and 6 ft. 6 in. deep at its deepest part. The holes for the fencing standards were drilled into the rock and ordinary 14-lb. standards driven into the holes. In places where the crush is likely to be greatest these are supported by other standards set in the rock at an angle as above, and bolted at the top to the uprights, making it impossible for the latter to bend outwards. Where no crushing takes place he found plain wires (seven in number) sufficient, but where there was any pressure he used 10-lb. tram rails bolted to the standards. Old 3-in. piping would do just as well, or where obtainable on the farm, blue gum or wattle poles. The gangway leading to the tank is 40 ft. long and 4 ft. wide, but Mr. Maggs is of opinion that a width of 3 ft. would answer better, as there would then be less chance of the animals turning back and

blocking the gangway. The same tank does duty for both his sheep and goats as well. One grave defect has to be pointed out and that is the limited size of the tank. It has been found that, to be effective, a swim of about 40 ft. should be provided for the cattle. That is, the top of the water line in the tank should measure 40 ft., including the outslope. This would, of course, add considerably to the cost. For a really well-constructed tank reference should be made to the article on East Coast fever in this issue.

African Entomological Research.

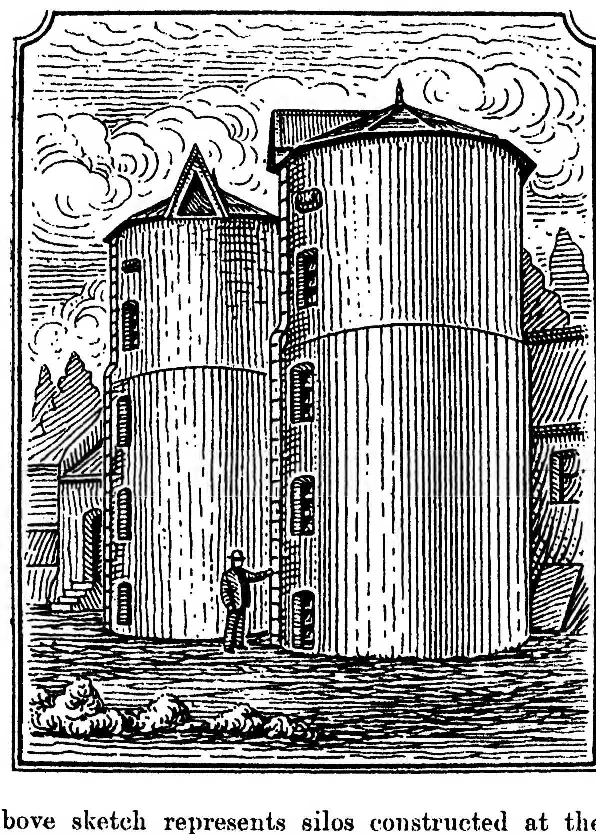
The necessity for the study of the entomology of Africa as a subject of vital as well as economic interest has been deeply impressed upon a section of the people of Great Britain, more particularly among those interested in the commerce of the central and northern sections of this continent. Lord Crewe, while Secretary of State for the Colonies in 1909, appointed a special African Entomological Research Committee which has been doing good work since. Just recently that body has received great help by an offer from Mr. Andrew Carnegie, who has placed at its disposal a sum of £1000 a year for three years to defray the cost of sending suitably qualified young men to the United States to study the practical applications of entomology which have received so much attention in that country. Three of these have been selected and two are already at work in the States. It is confidently anticipated that the scheme will be of great value to British Administration in Africa and elsewhere by providing a body of well-trained entomologists available for employment in the services of the different Colonial Governments. The Committee's offices are in the Natural History Museum at South Kensington, and a good deal of work has already been done in the shape of gathering material. The collections of insects after being properly identified and recorded are being distributed to the Schools of Tropical Medicine, Universities, Museums, and other institutions where they are likely to be of value for the purposes of teaching or scientific study. Two skilled entomologists are being employed under the direction of the Committee in East and West Africa respectively for the purpose of instructing and interesting the local officials in the work and also of carrying out special investigations. Further particulars can be obtained from the Secretary of the Committee, Mr. Guy Marshall, British Museum (Natural History), South Kensington, London.

Cheap and Useful Gates.

There are so many gates of various makes and descriptions on the market nowadays that it is more than difficult to offer anything entirely new. A correspondent, however—Mr. E. A. Jones, of Victoria Township, Johannesburg—sends the specification of a type of gate which he considers would be both useful and economical for general purposes and which could be adapted to the ideas and necessities of all. He recommends T-iron of suitable size for the frame. The corners should be riveted together and supported with triangular-shaped plates of iron to fit. The frame can, of course, be drilled for the wire at suitable intervals, which is then threaded

through as desired. He maintains that T-iron is better for gates than tubing, as the latter soon begins to double and twist. Gates of this pattern are made by several makers and have always given satisfaction. So have tubular-framed gates and gates with frames made of angle iron. As a matter of fact the value of a gate lies largelv in the workmanship and the quality of the material supplied. Gates of all recognized types last well provided they are made well in the first instance and hung properly when they are set up. The hanging of a gate has a great deal to do with its durability.

Silo at Elsenberg Agricultural College (Cape).



The above sketch represents silos constructed at the Elsenberg Agricultural College, Mulder's Vlei, near Capetown. They were built this year and have a capacity of eighty tons. They are 30 feet high and 12 feet in diameter each. The walls are of brick, one and a half thick for three-quarters of the height and one brick thick the remainder. They are cemented inside and out, and cost £90 each.

East Coast Fever.

ITS PREVENTION AND ERADICATION.

By R. W. Dixon, M.R.C.V.S., Acting Asst. Prin. Vet. Surgeon (Cape).

In view of the spread of East Coast Fever in the Transkeian Territories, its close proximity to our Border Districts in the Eastern portion of the Cape Province proper, and the possibility of this disease invading the coastal districts along the Border at no distant date, it has been considered advisable to warn stockowners of this imminent danger and to point out some methods which can be adopted by them to protect their cattle against this disease and even to eradicate East Coast Fever should it become established on a fenced farm.

Before doing so, a brief description of the principal prominent symptoms and post-mortem lesions are here given for the guidance of cattle owners, field cornets, and others.

Symptoms.

The visible symptoms are neither very definite nor characteristic. They are sometimes very similar to those seen in so-called "Gall Sickness" or "Bush Sickness", and it is often only during the last three or four days of the sickness that marked symptoms are observed: the affected animals frequently keep on feeding up to shortly before death.

The first evidence of the disease is high temperature (106° F. to 107° F.) followed by general depression, dropping of the ears and head with dribbling of saliva from the mouth and running from the eyes. There is constipation at first, followed by slight diarrhoea of a slimy nature and often tinged with blood. The urine is normal in colour unless complicated with Redwater, when the urine may be red. If the lungs are affected, symptoms somewhat resembling Lungsickness are shown, there being distressed breathing and a short cough.

A very frequent symptom consists of swellings behind the ears and in the throat due to a congested condition of the glands. Just before death the affected animal may show signs of delirium or may die in a comatose condition. The average incubation period lasts about ten days and the duration of the disease about thirteen days, the average time from infection to death being about twenty-five days. It will thus be seen that this disease is slow in its progress and not quick to kill, as many imagine.

Post-mortem Lesions.

These vary considerably, but some are quite diagnostic if the affected animal is allowed to die. If killed, however, in the early stage of the disease, probably nothing marked will be observed except a little enlargement of the liver. The flesh is generally of a yellow-brown-red colour

and the fat has a brownish yellow tinge. The lungs are often oedematous and on cutting into the substance froth and a straw-coloured fluid exude, this exudate often being so great that frothy foam is seen protruding from the nostrils after death, very much like that seen amongst horses dying from horse-sickness. Haemorrhagic infarcts of various sizes are also to be found in the lungs.

There may be a yellow-coloured liquid in the chest cavity and also in the heart sac, and small red spots on the surface of the heart. The liver is usually enlarged, rather yellowish, much congested and friable, due to fatty degeneration, the bile being thick, of a yellow or green colour and viscid.

The spleen is normal in size unless the disease is complicated with Redwater, when it may become enlarged. The kidneys are softened and the structure congested. Both in the lungs, liver and kidneys, red or yellowish-white patches of local necrosed tissue, called infarcts, are to be seen, these being caused by the blocking of the fine capillary blood vessels by organisms. They are of a red or yellowish-white colour, with an inflamed area varying in size from that of a pea to that of a hazel nut and are found raised on the surface or in the substance of the organs. These infarcts are of great importance in the diagnosis, as they are considered to be the most characteristic post-mortem lesion, but they need not necessarily be present in East Coast Fever.

In opening the abdominal cavity, a little fluid often escapes, and a yellowish discoloration with blood spots is found on the lining membrane covering the intestine (peritoneum). The contents of the first three stomachs are dry, the fourth stomach is the seat of inflammation, showing congestion, reddening and thickening of the mucous membrane, ulcers may be present at its exit into the small gut.

The intestines both large and small are congested with patches of haemorrhage (blood markings) throughout, particularly the small intestines. The lymphatic glands are much swollen and congested.

The most constant lesions are the presence of the infarcts in the kidneys, the swelling and congestion of the glands, and the inflammation of the fourth stomach and intestines.

Owing to the uncertainty of the symptoms (both visible and post-mortem) no veterinary expert, who has had any practical experience of East Coast Fever in the field, would venture to give a definite diagnosis until he had made a microscopic examination of a smear taken from an organ of an affected animal. Even a smear taken from the blood is not sufficient in every instance, for there is another disease prevalent amongst cattle grazing in our coastal districts which shows a parasite in the red blood cells resembling that seen in East Coast Fever. It is only by finding the peculiar bodies known as "Koch's" or "Blue" bodies, which are to be invariably seen when making microscopical examinations of organ smears taken from East Coast Fever affected animals, that a definite and correct diagnosis can be made.

It is of great importance that the *first* case in an outbreak of this disease should be promptly diagnosed, and on this account whenever an animal is seen to be sick, a blood smear taken from the ear should be

immediately made and should the animal die, organ smears, preferably from the spleen, should also be made and sent to a Government Veterinary Surgeon for examination.

The following are the directions for taking blood and organ smears :—

Directions for taking Blood Smears.

From the Living Sick Animal.

(1) Clip hair from edge of ear and clean place thoroughly.

(2) At clipped portion of ear make a small cut with a knife or prick it with a needle.

(3) Allow a drop of blood to drop on the glass slide or put it on the slide with either (*a*) a piece of clean paper, (*b*) the point of a knife, or (*c*) the corner of another glass slide.

(4) Then *immediately* place the edge of a second slide at an acute angle upon the slide upon which the drop of blood has been placed, and draw the edge *gently and slowly* over the slide making as *thin a film of blood* as possible.

(5) Dry the slide *as quickly as possible* by waving it to and fro.

(6) Wrap each glass slide so taken in a small piece of thin paper before placing it in the packet.

(7) Send a short note with slides, giving owner's name and address, and if possible, symptoms, length of illness and disease suspected.

From the Dead Animal.

Smears should be taken in the same way as above from the *spleen, liver* or *lymphatic glands.* Cut the organ with a *clean* knife and scrape off a small piece of the cut surface with the edge of a glass slide.

Note.—Two smears should always be taken. The glass slides should be handled *by gripping them on their edges only*, as the fingers, however clean, leave grease marks. The slides should be *thoroughly* cleaned and kept free from *dust.* They should be polished with a *clean* cloth or handkerchief *immediately before use.*

In order to fight this disease successfully, its cause and the manner in which it is propagated must be known. Under natural conditions the disease is transmitted solely through the bite of ticks, and there are five species, all belonging to one family, that have been found to convey the disease.

For the purpose of eradication of ticks, it is necessary to have a knowledge of the habits and life cycles of the different species which infest domesticated animals, and thanks to the investigations of Messrs. Lounsbury and Theiler, the life cycles of the different species of ticks infesting our cattle are now known.

It is a common error, believed however by many, that cattle ticks breed on the ground and get on and off animals promiscuously in order to feed. This is incorrect: most species of ticks have their natural hosts upon which they must pass certain periods of the different stages of their life cycles in order to develop.

The following are the stages of the life cycles of ticks :—(1) eggs, (2) larvae or seed ticks, (3) nymphae, (4) adults or sexual ticks.

Starting with a male and female which have met and copulated on an animal, the following is a description of the habits of East Coast Fever ticks during their life cycle : the engorged female is ready to fall to the ground to lay her eggs : she finds some suitable place to lay her eggs either in grass or soft soil and after laying, she shrivels up and dies : the male remains on the host for some considerable time for breeding purposes. The eggs after a lapse of certain periods, which run from weeks to months according to the species of ticks and atmospheric conditions, begin to hatch out and the young larvae appear. These larvae crawl up the stalks of grass or on the branches of bushes, and patiently wait until an animal comes along to which they can attach themselves.

One species of tick, the blue tick (*Rhipicephalus decoloratus*), the natural transmitter of Redwater, passes its complete life cycle on one host, but the five species of ticks which transmit East Coast Fever must have two or more hosts to complete their life cycle to enable them to propagate the disease.

Four kinds of brown ticks and the red or red-legged tick, transmit East Coast Fever. All the brown ticks require three hosts, the red tick requires only two, as during the first two stages of its life cycle it remains on the same host.

The life history of the brown ticks is as follows :—the larvae, which like all larvae, have six legs, having found a host, begin to suck blood, and after repletion which takes from three to five days they drop off : after a period of from fourteen days upwards, according to climatic conditions, during which time the larvae have changed their skins and developed eight legs, another host is found and, after taking from three to five days to replete, they again drop to the ground, when a second moult occurs : the tick now becomes an adult—the second moulting taking on an average about eighteen days—the adult then finds her host and in about a week becomes fully engorged after meeting the male on the animal and becoming fertilised.

The red tick : this species have distinct red legs : the larvae crawl deeply into the ears of their hosts and do not leave until they have become fully fed as nymphae. The moult from larva to nymph takes place on the animal and the period they remain in the ears is about fourteen days : as engorged nymphs they drop off on to the ground and undergo their second moult which takes about twenty-four days, after which as adults they remain on their host about seven days.

The disease can be transmitted naturally either in the nymphal stage after feeding as larvae on sick cattle, or as adults after sucking blood from sick animals in the nymphal stage. Once an infected tick has bitten an animal it apparently cleans itself of its poison since it afterwards fails to infect other animals. For instance if, after biting a susceptible healthy ox which becomes infected, the tick drops off and gets on to another healthy susceptible ox in its next stage of development, it fails to infect the second time, because it has not been long enough in the previous host to become re-infected. Should the infected tick bite a horse or any other animal

except bovines, the poison is discharged without affecting the animals bitten, and the tick becomes non-infective. Unlike Redwater, the poison does not pass through the egg from an infected tick.

The majority of cases of infection on the veld are probably caused by the adult brown ticks (*Rhipicephalus appendiculatus*) which as nymphs are found on the edges of the ears and around the eyes, and which, as nymphs, have fed on cattle in the last stage of East Coast Fever. No animals other than bovines can carry the infection, and recovered cattle are incapable of conveying infection to ticks.

Knowing thus that ticks are the only transmitters of the disease under natural conditions, precautions must therefore be taken against the spread of infected East Coast Fever ticks into clean areas. Affected cattle if not kept under strict supervision as to movement will drop infected ticks all over the veld, and another serious danger exists in allowing human beings to travel at will in and out of badly infected areas. At the present time there are millions of East Coast Fever infective ticks, hungry having moulted, sitting on the stalks of grass in the infected areas of the Transkei, ready to attach themselves to animals or to the clothing of anybody walking through the veld. Natives, in ignorance, and tempted by a feed of meat, are constantly going into the infected areas and then returning to their kraals, and no amount of guarding can prevent them from so doing if they are so disposed. They realise the danger attached to strange cattle coming to their kraals, but they do not realise the danger of infection by means of ticks unintentionally carried by them on their clothing, blankets, etc. They consider that it is safe so far as their cattle are concerned if they do not bring any of the diseased meat away with them except that which they have eaten.

Ticks may also be carried in grass, hay, etc., but as far as game, horses, sheep and goats are concerned the danger would appear to be slight, for free movement of these animals in and out of infected areas in the Transvaal has been going on for many years without actual proof being forthcoming that these animals are implicated as carriers of the disease. The brown and red ticks will attach themselves to game, horses and goats, and bite readily. It is possible for pathogenic East Coast Fever ticks to be carried by birds for considerable distances without becoming attached and losing their infective power.

With the knowledge which has been gained respecting the causation and nature of this disease, the good results which have followed the strict control of movements of cattle in infected and suspected areas, and the systematic dipping of cattle carried out thoroughly and frequently for some years past, it is becoming more evident every day that with a fenced farm and a dipping tank in which cattle can be properly dipped East Coast Fever can be successfully combatted. If dipping is systematically carried out, combined with fencing, it will be found to greatly lessen the risk of infection by reducing the number of ticks capable of carrying the disease, but as a preventive of East Coast Fever dipping must be started before the appearance of the disease on a farm or even in the District.

In 1899-1900, the Cape Veterinary Department, in conjunction with Mr. Lounsbury, then Government Entomologist for the Cape Colony,

conducted a series of experiments with a view to finding a cheap, effective and safe dip for tick destruction, with the result that plain Arsenite of Soda (scrub exterminator), with or without the addition of soap, was found to be a cheap and efficient preparation when used as a spray for destroying ticks. Again in 1904, further tests were made, which proved that plain Arsenite of Soda in solution containing four to five pounds to every 100 gallons of water was quite as efficient as a tick destroyer or tick deterrent as the tar, arsenic, soap, dips.

Since that time, plain Arsenite of Soda solutions have been used extensively throughout the tick-infested areas of the Eastern Province (Cape), as a cattle dip for the destruction of ticks, but there are certain conditions necessary to be observed in order to obtain successful dippings with Arsenite of Soda :—

1. The Arsenite of Soda must be of uniform strength, i.e. it must contain a fixed percentage of Arsenious Oxide, *which must not vary.* The Government have hitherto been supplying Arsenite of Soda (68 per cent. Arsenious Oxide), but now intend obtaining supplies of a purer form containing 80 per cent. Arsenious Oxide.

2. The materials employed for dipping must be weighed and measured correctly, and accurate measurements of the capacity of the dipping tank at certain levels should be obtained.

3. Allowance must be made for evaporation. It is estimated that in an ordinary sized cattle dipping tank, there is an evaporation of twenty-five gallons weekly on an average during the summer months.

4. Atmospheric conditions have a lot to do with the results of dipping both on the ticks and on the systems of the animals. The best weather to dip, is when it is cloudy, and the best time of the day is usually late in the afternoon for the reason that the dipped animals remain wet longer and the action of the Arsenite in solution is therefore maintained for the longer time.

The cattle should not be dipped when misty rains are prevailing, neither should they be dipped during thunderstorms or heavy rains.

5. Cattle should not be driven through a tank when they are in a *heated* condition, nor should they be *rapidly* driven back to their pasturage after dipping. Many losses occur from these precautions not being observed.

6. The proper construction of a cattle dipping tank is necessary for successful dipping. The approach to the tank (in slope) should not be too sloping or smooth, in fact it is preferable for it to be nearly level and rough, so as to enable the beast to have a firm foothold when plunging into the tank.

At the entrance to the tank, the drop should be *vertical* and not slanting—with the slanting drop cattle often do not get completely immersed, the heads often escaping, and for East Coast Fever the ticks in the ears and on the head must be attacked and destroyed.

It is better to have a long swim than a short one. A forty-foot swim—i.e. the water line should extend for forty feet on the surface—is considered the proper length.

7. It is advisable to clean out the dipping tanks occasionally, all the dip and dirt being removed and the tank then refilled.

The frequency of this operation depends a good deal upon the number of cattle being dipped. In public dipping tanks where thousands of cattle are being immersed monthly, three months is not too short an interval between cleanings, not only on account of the tank becoming very filthy in such a period, but it is found that where arsenical solutions are being used for cattle dipping there is a slow process of decomposition going on due to oxidisation, and in consequence thereof, *Arsenate* of Soda is formed, and this compound is found to have very little killing power on ticks, and is more likely to scald the cattle than is *Arsenite* of Soda.

If the above conditions are carefully observed, cattle can be dipped safely once a fortnight, and that regularly for a long period in a solution containing *four* pounds of Arsenite of Soda (68 per cent. Arsenious Oxide) to every 100 gallons of water, but farmers who have extensively used Arsenite of Soda recommend for regular fortnightly dippings in summer and winter, 3½ lb. of Arsenite of Soda (68 per cent. Arsenious Oxide) to every 100 gallons of water, or three pounds of Arsenite of Soda (80 per cent. Arsenious Oxide) to every 100 gallons of water, as sufficient.

One gallon of boiling water easily dissolves three pounds of Arsenite of Soda, after which it mixes easily with the cold water and remains permanently in solution.

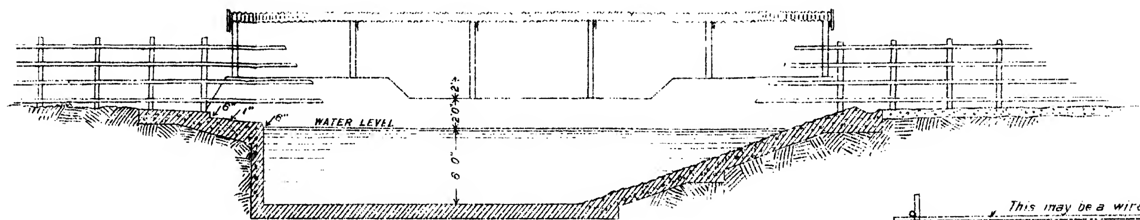
The advisability of adding soft soap to the Arsenite of Soda when used as a cattle dip would appear questionable as the results obtained from this addition do not justify the extra cost entailed. If the soap would remain in solution in the presence of Arsenite of Soda and not undergo decomposition more especially when hardish brack water is used (and often this is the only kind of water obtainable), it would answer its good purpose and prove advantageous by prolonging the action of the Arsenite of Soda solution on the skin, it being found that a plain water solution tends to dry quickly, especially on a hot day. Unfortunately the soapy consistency of the solution is found not to last long when brack or hard water is used. If it did, it would be found that less arsenic would be required in the solution to kill ticks.

The action of the Arsenite on the ticks is not rapid for it takes about four days after dipping for them to die. At the first few dippings there is a tendency for the animals to become scalded and otherwise affected, and many of the ticks appear not to be seriously affected, but a few weeks only are necessary to accustom cattle to being dipped without any discomfort to themselves and with good results as regards the destruction of the ticks.

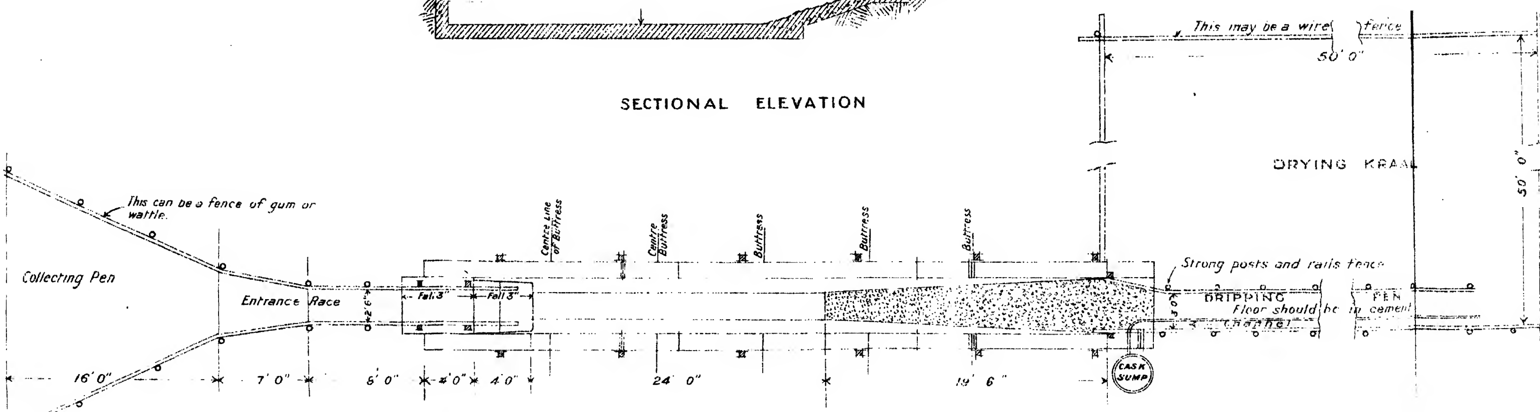
"SHORT INTERVAL" DIPPINGS.

In Natal it has been found necessary to adopt weekly and even "five-day" dippings in those districts where the disease is prevalent in order to fight East Coast Fever. Since the brown ticks only remain on their hosts for from three to five days, both in their larval and nymphal stages, and the other transmitter, the red tick, remains only for from seven

Suggested Plan for Dipping Tank.



SECTIONAL ELEVATION



Approx. Quantity of Material : 33 Cubic Yards of Concrete.
Approx. Cubic Capacity of Tank : 3900 Imp. Gallons.

Proportions.	Amount Required.
6 Stone	198 Barrels
3 Sand	99 Barrels
1 Cement	33 Barrels

GROUND PLAN

SCALE 8 FEET TO THE INCH.

TIMBER, Etc., REQUIRED FOR ROOF.

6. Uprights each 11' 0" long x 4½" x 4½"
6. ,, ,, 10' 0" long x 4½" x 4½"
28 ft. run of cross ties 4½" x 1½"
92 ft. run of longitudinal pieces 4½" x 3"
24. Sheets of Galvanized Iron 8ft. long.

to eight days on its host in its shortest stage as an adult, at least one dipping every week is necessary to make any rapid and marked diminution in their number.

Mr. Watkins-Pitchford of Natal has prepared a dip which he has named the "Laboratory" Dip, which is being largely used all over Natal as a weekly and even as a "five-day" dip with excellent results.

The "Laboratory" Dip contains :—

Arsenite of Soda (80 per cent. Arsenious Oxide) ..	8½ lb.
Soft Soap	5½ lb.
Paraffin	2 gallons.
Water	400 gallons.

The details for preparation are as follows :—

Dissolve the soap in about 5 gallons of hot water, while still hot add this soap in small quantities at a time to the paraffin and beat or stir to a creamy lather. This makes the soap emulsion. Dissolve 8 pounds of Arsenite of Soda in 2 gallons of hot water, and when completely dissolved add cold water up to 50 gallons. The soap solution may then be gradually added stirring thoroughly the while, water should then be added until the 400-gallon tank is full. When filling a dipping tank, the above procedure must be repeated for as many times as it is found necessary, or one mixing may be made sufficient for the purpose. 400 gallons however is found to be a sufficient quantity to handle nicely at one time. The addition of the soft soap and paraffin emulsion is employed principally to assist in maintaining the action of the arsenite in a moist condition on the skin longer than if plain arsenite solution in water only is used.

For those who do not wish to incur the expense of the addition of soap and paraffin and the amount of extra labour involved in mixing the different ingredients in the "Laboratory" Dip, a plain solution of Arsenite of Soda (80 per cent. Arsenious Oxide), 2 pounds to every 100 gallons of water will be found effective for weekly or "five-day" dippings.

It will be found advantageous to hand-dress the ears, under the tails and brushes of cattle, occasionally, with some sticky mixture for the purpose of assisting the killing of the ticks that congregate there, as it is found along the coastal districts that dipping alone is not quite effective for these ticks. The following preparation is recommended for dressing the ears and tails :—

Stockholm Tar....................	Half a gallon.
Resin (cheapest quality)...........	Two and a half pounds.
Caustic Soda......................	Half a pound.
Water..........................	Two and a half gallons.

Crush the resin, which can be easily done by pounding in a meal bag, put one gallon of water in a drum or cooking pot with the caustic soda, bring it to the boil, then gradually stir in the powdered resin, boil for ten minutes until all is dissolved and the solution like strong coffee in colour, then add the Stockholm Tar and hot water to make three gallons of the mixture. This preparation is to be applied with a swab after dipping or between dippings.

In order to be successful as a preventive of East Coast Fever cattle dipping must be started and employed systematically. Before the disease makes its appearance on the farm or even in the District, dipping at least once a fortnight should be practised, and in the event of the disease breaking out in the District weekly or "five-day" dippings should be carried out.

Another preventive measure which can be adopted to enable a farmer to safeguard himself against heavy loss in the event of an outbreak of East Coast Fever on his farm is the employment of "temperature" camps. This is done with a view to moving healthy stock out of an infected area and leaving the infected cattle behind. Many outbreaks have been dealt with by this method with a minimum amount of loss. In order to carry this out successfully, a fenced farm with plenty of spare cattle veld is required, and the following precautions are necessary. Upon the approach of East Coast Fever in the District, a portion of the farm should be fenced off and under no conditions should cattle be grazed there, this being looked upon as clean veld. It would be better for this ground to be divided into two or even more camps. Should East Coast Fever break out, all the cattle except those visibly sick (which should be immediately destroyed) are brought to this clean veld where they are detained for from twenty-one to twenty-four days. Temperatures of all these cattle are taken and any showing high temperatures (103·4 degrees F. and over) should be considered as infected, turned out of the camp, and either tied up or destroyed. After the expiration of twenty-four days all animals which on that date pass the temperature test satisfactorily can be looked upon as free from the disease and can then be passed on to the other clean camps.

Another and even simpler method of freeing a herd from infection, particularly when the number of animals is large and there is difficulty in taking their temperatures, is to provide two temperature camps, and to keep the herd first in one camp for a period of sixteen days, and then transfer it to camp number two for a similar period; subsequently all visibly healthy animals can be turned out on to clean veld, those which have developed disease during detention being destroyed in the isolation camp. In this way a herd can be freed from infection with a minimum of trouble and a certainty of success in 95 per cent. of the number of outbreaks dealt with, but those who attempt to shake off infection by either method must, of course, bear in mind that the paddocks in which the infected animals have been camped will continue to be infected for a period of fifteen months after the cattle have been cleared out.

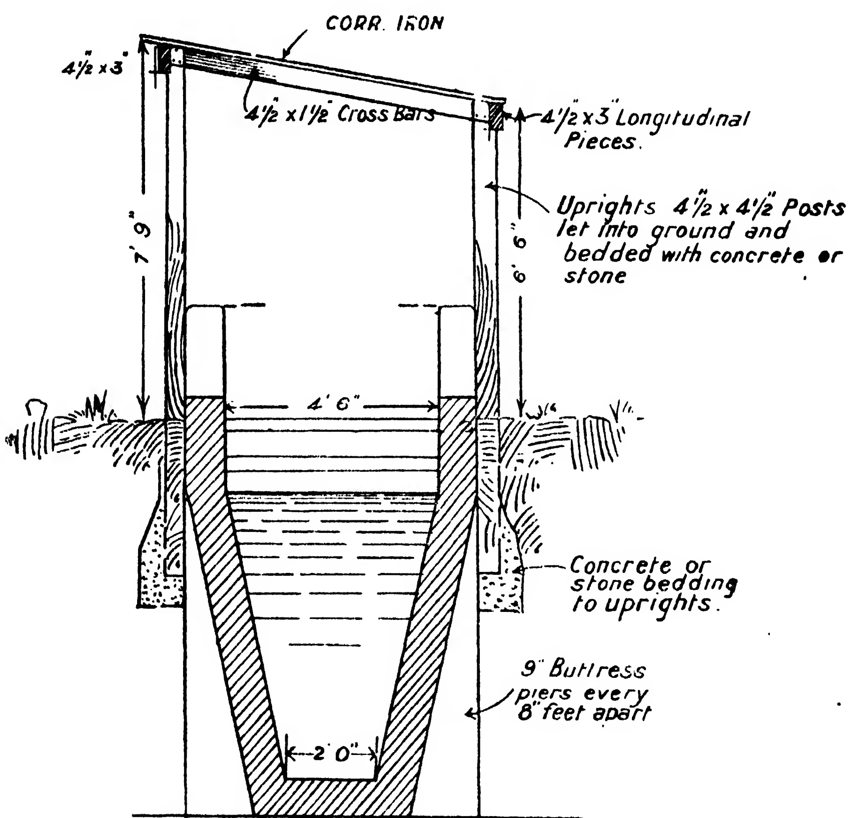
Given a properly fenced farm with a cattle dipping tank upon it and the adoption of the methods recommended above, every farmer is in a position to save his herds of cattle from the ravages of East Coast Fever, but it is of very little use waiting until the disease appears on a farm before commencing dipping with the view of preventing or eradicating the disease without serious mortality.

A Bill has recently been passed to provide for making advances to owners of farms and to natives in locations for the building of Dipping Tanks and purchase of Spraying Machines. Such loans will be granted for a period of not exceeding ten years, repayable in yearly instalments

with interest at the rate of 4 per cent., the first instalment becoming due two years after the advance has been made. All information on this subject can be obtained from the Resident Magistrates.

In order to detect any deterioration in the strength of cattle dips owners can have samples analysed upon payment of 5s. The samples submitted for analysis must be sent to the Government Analyst at Grahamstown.

PLAN FOR DIPPING TANK.



SECTION

SCALE ¼" = 1 FOOT

Building a Cattle Dipping Tank.

A plan of a Cattle Dipping Tank of cheap design is here shown with an improved approach, not too sloping and the surface rough.

Site.

It is necessary to have the tank built near water, on ground with a sloping surface for draining purposes and which is not likely to become a swamp after heavy rains. Before finally deciding on a site a trial hole should be dug about 10 feet deep in order to ascertain the nature of the soil at the foundation. The best kind of soil to build in, is ironstone gravel, but a loamy or even a sandy soil is better than the heavy clay soils which are so commonly met with, as these clay soils expand in summer and contract in winter and should therefore be avoided.

Materials.

The choice of materials for the construction of a dipping tank will depend upon what is locally available. The majority of tanks are built of concrete Where good building stone is available it will be found cheaper to use this material, more especially in those localities where the cost of carriage on cement is high.

Some tanks have been constructed of well burnt brick (clinkers) but care must be observed in their selection so as to avoid the bricks being too porous; on no account should farmers use ordinary kiln-burnt bricks.

Only a first-class brand of cement should be used. Cheap brands of Belgian or German cements should be avoided.

When public dipping tanks are being constructed for municipalities, native reserves, mission stations or locations, and where all sorts of cattle more or less wild are being constantly dipped, it is essential that the Receiving Kraal and Dripping Race should be securely fenced with posts and rails, for it is found from practical experience that where wire fencing is used in their construction, it soon becomes broken and consequently has constantly to be put in good repair.

Many private tanks where successful dipping is carried on have no roofs or covers: these are not absolutely essential, but it is, however, considered desirable to furnish roofs or covers for public dipping tanks.

The cost of building a dipping tank in accordance with the enclosed design will depend largely upon the locality, the material employed which is locally available, and the cost of labour. Many farmers build useful tanks of concrete, like the design shewn, with their own unskilled labour for about £75, but where strong fences (wood and rails) are needed the cost is greatly increased.

ADDITIONAL NOTE ON "THREE-DAY" DIPPINGS.

Recently at Pietermaritzburg Mr. Watkins-Pitchford has recommended dippings at intervals of only three days when a farm has become infected with East Coast Fever, as under such circumstances it is necessary to actually fight the disease and not to allow any tick a chance to drop off between dippings without having first been treated with the dip. Every East Coast Fever tick must be looked upon as potentially harmful and should not be given a chance to escape unharmed.

It has already been pointed out that these short interval dippings are necessary owing to the brown ticks usually remaining on their host.

only for from three to five days, and sometimes even less than three days in their larval and nymphal stages.

The quantity of Arsenite of Soda required for "three-day" dipping is considerably weaker than that for use at longer intervals, being 50 per cent. less than in the "Five-Day" Laboratory Dip, consequently four pounds of Arsenite of Soda (80 per cent. Arsenious Oxide) to every 400 gallons of the mixture of soft soap, paraffin and water is considered sufficient and safe.

Mr. Watkins-Pitchford was able to show a herd of cattle which had been dipped regularly every seventy-two hours and in all kinds of weather for seventy dippings and they were still in good condition after seven months of this treatment, simply having been grazed on the veld without artificial food of any sort. There had been no skin irritation, accident or sickness of any kind amongst them. He was also able to show that by three-day dippings it was possible to prevent the escape and development of any infectious forms of ticks, even if not to kill every tick outright.

Two experiments were conducted to prove this:—

Two paddocks were obtained and were badly infested with non-pathogenic East Coast Fever ticks by liberating many millions of larval brown ticks, and a number of cattle were placed therein to become badly tick-infested and also to breed ticks. Cattle infected with East Coast Fever were turned in to the paddocks one by one at intervals of a week and were allowed to remain there until they died.

In No. 1 Paddock, sick cattle were turned in, these having been freed from ticks by having been frequently sprayed with "Three-Day" dip prior to being placed in the paddock, although they became reinfested by the ticks in the paddock.

In No. 2 Paddock, sick cattle with East Coast Fever ticks upon them were turned in, but they had been sprayed previous to introduction.

The sick cattle in both Nos. 1 and 2 Paddocks received a spraying every seventy-two hours until death.

None of the susceptible cattle, that were kept in these paddocks during a period of several months while the experiments were being conducted, became infected with East Coast Fever.

The result of these experiments tend to show that it is possible under ordinary conditions to dip cattle at intervals of three days for a long period with safety, and further to promptly stop the spread of the disease on an infected farm, even when dipping had not been practised previously. Such evidence is further proof of the efficacy of dipping as a means of eradication of East Coast Fever, and also demonstrates the desirability of adopting systematic cattle dipping before the disease makes its appearance in a district. It is hoped, however, that undue advantage will not be taken of this information to make it an excuse to postpone systematic dipping until the disease is on the farm.

For many reasons which are obvious it would not be possible for many cattle owners in the Cape Province to adopt "three-day" dipping for any long period without incurring considerable inconvenience and possibly expense, but there are some owners with small herds who could

conveniently have their cattle collected every few days for the purpose of dipping without seriously interfering with the usual routine work on a farm. To such stockowners as are desirous of quickly eradicating ticks, short interval dippings of three, five or seven days would prove more advantageous than intervals of fourteen days. At the present time the only weapon available for fighting East Coast Fever successfully is dipping, and it is highly probable that in a fenced country populated by intelligent cattle-owners, it will prove the most effective one, notwithstanding the possibility of a successful preventive method of inoculation being discovered in the near future. Eradication of ticks means eradication of East Coast Fever and many other diseases affecting stock in South Africa.

Varieties of Apples Suitable for the Orange Free State.

By C. P. VAN DER MERWE, Assistant, Horticultural and Botanical Division, Orange Free State.

THE Orange Free State, and especially those districts which have a sufficient rainfall to enable fruit trees to be grown without irrigation, undoubtedly holds great possibilities in apple growing; but a serious difficulty in the way of the development of this industry has been the want of information on the most suitable varieties owing to limited experience. People who intend to plant apple trees will, therefore, be interested in a report by a leading Covent Garden firm upon fruit grown at Mr. H. E. V. Pickstone's farm Platkop, District Ficksburg.

Mr. Harper, who is the manager for Mr. Pickstone at Platkop, states that the fruits were not specially picked out. They were the ordinary No. 1 grade as sold in Johannesburg, and packed by one of his Kaffir packers.

The fruit was shipped in ventilated hold, and was examined by Mr. Pickstone's representative at Covent Garden soon after arrival, who found that Missouri Pippin, London Pippin, Ballarat Seedling, Pomme de Neige, Commerce, and Rome Beauty were free from bitter pit. Stone Pippin had 20 per cent. bitter pit; Cleopatra and Versfeld, 25 per cent.; and Lord Wolseley, 50 per cent. Three weeks later Messrs Parsons & Co., of Covent Garden, reported as follows upon the consignment:—

"The following is our opinion of the quality and possibilities of each separate variety:—

"*Rome Beauty.*—Slight signs of bitter pit, but on the whole an excellent sample of apples, and in our opinion would command a paying price on this market in large quantities.

"*Cleopatra* appears to us in about the same condition as when we examined it before. Of course, as you know, the variety is one that is always in strong demand here. The bitter pit is rather pronounced, but still we think they would pay to ship.

"*London Pippin*, or, as we call it here, the Five Crowns, is excellent, and we think improves every time we inspect it. We are very pleased with this variety.

"*Sturmur Pippin* appears very good, but slight signs of bitter pit. This of course is a well-known variety, and undoubtedly would pay to ship.

"*The Snow* (Pomme de Neige), or, as it is called in Canada, Fameuse, is a splendid sample. It appears quite free from pit, and is also well known, particularly in North of England and Scotland, and would pay to ship.

"*Apple of Commerce*, which we had so long a discussion over, has coloured up beautifully, and we agree with you that it is indeed a very fine apple. Its appearance alone would sell it, and there are no signs of disease.

"*Lord Wolseley.*—Badly pitted; fine, showy apple, but we are afraid on account of the disease would prove a failure on the market.

"*Ballarat Seedling.*—This variety has improved by keeping, and does not show any more signs of disease than when we inspected it together. We certainly think this is a variety well worth shipping to England.

"*Stone Pippin.*—This is a commoner variety, and we presume it would cook well, but as far as we can gather it is not the same variety as the English Stone Pippin. Nevertheless we think this is all right for London.

"*Versfeld* is an inferior apple altogether, and we do not recommend shipment of this to England, although it shows no very bad signs of disease, but it is the shape we object to more than anything else.

"*Missouri Pippin*, last but not least, which in our opinion is the finest quality of the lot. It has improved considerably in keeping, and the disease is practically nil. We feel sure that this is an apple which will command a remunerative price.

"Taking all things into consideration, we think that this selection of apples, which you have sent on trial to this market, when shipped in bulk would supply a want between the suppliers from America and Australia, and if they are packed after the style of Watsonville Newtons, taking great care that the apples do not get bruised in transit, we feel sure that there is a great future for the apple industry of South Africa."

Mr. Harper, in commenting on this report, writes that although the report mentions that it would pay to ship Cleopatra and Sturmer Pippin, he does not think it advisable to plant these varieties, and that the clean varieties should be preferred.

There are enough good varieties, and it is just as well for the ordinary man to leave the doubtful ones alone.

Some difference will be observed in the two reports upon the extent of bitter pit in the different varieties. But this can no doubt be explained in the case of the Rome Beauty by the fact that the second examination was made some time after the first, and bitter pit may have developed in the meantime; and in the case of the other varieties, which from the first report would appear to be rather badly affected (but are stated by Messrs. Parsons & Co. to show only slight signs of the disease), that though a fair proportion of the fruit showed the trouble, those attacked were not seriously affected.

Education in Chemistry at the Cape.

(Presidential Address delivered to the Cape Chemical Society, 28th April, 1911.)

By Prof. B. DE ST. J. VAN DER RIET, M.A., Ph.D.

GENTLEMEN,—Five years ago I had the privilege of addressing you as the first President of the Cape Chemical Society, and I now thank you for electing me a second time. In the first years of its existence our society has made a good beginning. Beyond attending to professional affairs, such as the selection of standard methods of analysis, our members have shown activity by publishing quite a number of useful and interesting papers.

The appearance last year in book form of Dr. C. F. Juritz's pioneer work on the agricultural soils of Cape Colony merits more than a passing reference. This book now gives to the world the results of years of painstaking labour, carried on by our former president and his co-workers in spite of serious obstacles and delays. It is to be hoped that Dr. Juritz's achievement is appreciated by all interested in scientific agriculture at the Cape, and that with the spread of education in chemistry the number of people so interested will greatly increase.

Our congratulations are due to Dr. Joseph Lewis on taking the Cape D.Sc. degree by virtue of a research "On the development of the grape and on certain changes in grape-must produced by the alcoholic fermentation". This work, when fully published, will prove a welcome and valuable contribution to the study of the œnological problems peculiar to the Cape.

A subject of interest to chemists the world over is the centenary this year in Italy of Avogadro's famous hypothesis. We heartily join with our Italian fellow-chemists in doing honour to one of the world's great philosophers.

The news of the death of Professor J. H. van 't Hoff has been received recently with regret by all chemists. In an interesting little article which Van 't Hoff wrote last year for the volume presented to that *doyen* of modern Dutch chemists, the octagenarian Prof. van Bemmelen, Van 't Hoff gives an account of his own struggles with the difficult problem of the chemistry of the salt deposits at Stassfurt. After a modest reference to the success of his work, he ends with words which have now a pathetic interest:—

Voor mij bracht dat alles de vrijheid van het zoutvraagstuk afscheid te nemen, en nog mijn krachten te wijden in geheel andere richting, waarvoor de regeering mij op het domein Dahlem een stuk grond beschikbaar stelde en waar ook weer mijn nieuw nu wel mijn laatste laboratorium staat.

The subject on which I now propose to address you involves issues of considerable importance, and has such a wide scope that it might well be taken in hand by a parliamentary commission, with powers to

visit the principal centres of education so as to collect evidence from different sources. One can imagine such a commission drawing up a schedule of institutions where chemistry is taught under the heads: (*a*) schools, (*b*) agricultural schools, (*c*) university colleges (with and without technical classes), (*d*) technical college, (*e*) chemical works training learners. Then there could be details as to the number of chemistry teachers and scholars at each institution, and the nature of the equipment provided for instruction in chemistry.

It may be that the commission would, as a result of its labours, be able to throw light on sundry most difficult problems, wider and deeper than the mere question of education in chemistry, such as the question how to concentrate the true university work in chemistry (and other subjects as well) in one " specially favoured institution " and yet " safeguard the interests of the various existing university colleges "; and further, the question as to " where college work ends and where true university work begins ".

It would hardly be safe to hazard a guess as to the nature of the finding of an impartial and capable commission on these intricate questions. There would probably be a minority as well as a majority report. But no one will question that the mere statement of facts and figures contained in the report would bear eloquent testimony to the great advance in the teaching of chemistry at the Cape in the thirty-one years that have passed since the day when Professor Hahn's laboratory at the South African College was practically *the only* chemical laboratory in South Africa. And further let me add, in parenthesis, that the commission would only be doing bare justice to Dr. Hahn if they were to place much of this advance to his credit.

It is also reasonably certain that the commission would find that the Government-aided institutions inspected by them all needed *more money*—for increase of staff, for laboratory accommodation, for " requisites ". This money, required for teaching the expensive subject " chemistry " to the sons and daughters of comparatively well-to-do people, would be demanded *from the Government*. In the Union of South Africa there are many poor taxpayers, among them a number who lack the rudiments of education, some of them even reverting in outlying districts to a condition which has been described as " barbarous ". Under these circumstances the Union taxpayer might well be pardoned if, after reading the report of the commission, he asks such questions as—" Is this education in chemistry necessary for our national well-being? " " Should the State pay for instruction in chemistry? "

In answer to such questions the chemist can point to what the study of chemistry has done for the great civilized nations of the world, or he may boldly quote the words of P. T. Austen in the *North American Review* (1896). Austen wrote:—

It is fair to hold that the country that has the best chemists will in the long run be the most prosperous and the most powerful. It will have at the lowest cost the best food, the best clothing, the best manufactured materials, the fewest wastes and unutilized forms of matter, the best guns, the strongest explosives, the most resistant armour. Its inhabitants will make the best use of their country's resources; they will be the most healthy, the most free from disease; they will oppose the least resistance to favourable evolution; they will be the most thrifty and the least dependent on other nations. The education of its people in chemistry and the physical sciences is the most paying investment that a country can make. Competition to-day between nations is essentially a competition in the science and applications of chemistry.

These are striking words, the truth of which will not be denied by those who have studied the methods whereby the Japanese in recent years have risen to prosperity and power.

But these words, though they support State-aid towards the teaching of the physical sciences, do not in the least indicate that there should be an absence of economy where education in chemistry is concerned. Bearing this in mind, the problem before us is how to train "the best chemists" that South Africa can produce; and, further, another problem, how to spread far and wide among our citizens ideas which are the essence of chemistry as applied to a wholesome national life, and the wise conservation and development of our country's great natural resources.

There has been much discussion—during the last six months especially—on the subject of the foundation by the Government of a "National University", and it is understood that the Government intend to establish such an institution to form, as it were, a coping-stone to the structure of our educational system. I am sure that the members of our society hope great things from the future chemistry department of such a university, and that we welcome in grateful spirit the generous offers which have been made from private sources in support of the scheme.

There is undoubtedly every reason to hope that such a national institution will be provided with equipment in apparatus and books of reference such as one finds in, say, a modern German university. Also that there will be a staff of professors of chemistry, say five (representing inorganic chemistry, physical chemistry, organic chemistry, pharmaceutical chemistry, and technological chemistry respectively), with about ten capable demonstrators and several laboratory attendants. Unless the chemistry department of the National University is to be manned, as well as equipped, on at least such a scale as outlined above, let no one deceive himself by supposing that the foundation of a new institution is really justified as far as chemistry is concerned. In the case of a national university a liberal endowment is consistent with true economy. South Africa can surely afford to maintain *one institution* with facilities approximating to those of the University of Halle, where the entrance qualification in chemistry for a Cape student is the Cape B.A.

But, however necessary it may be to have at least one well-equipped institution for university work in South Africa, after all the first important consideration in the development of our future chemists lies in the nature of their preliminary training. The boy who has been encouraged to cultivate a love of natural science does not need to be "led" or "pushed on" afterwards when he reaches the college and, later, the university.

How is a boy to receive the first impulse? I fear that in some of our schools boys are still taught to "get up" chemistry by repeating notes and pages from textbooks. This may have a certain value in training the memory and in fostering ability to plod through a distasteful task, but the pupil who undergoes the process as a rule develops a positive dislike for real chemistry, and no wonder! The very first steps in chemistry under competent guidance may be made vividly interesting by practical work, and at this early stage an application of the principles of the "kindergarten" system does not seem out of place. Subjects like physics and chemistry provide the skilful teacher with

rare opportunities for educating his pupils by developing their powers of observation, quickening their intellects, and directing the natural inquisitiveness of the youthful mind along healthy, stimulating channels.

It is a hopeful sign of progress that the importance of laboratory experience, so thoroughly recognized in college work in South Africa, is beginning to receive recognition in schools as well. There are now well-equipped laboratories in some of our high schools where work is done by capable teachers who merit all the support and encouragement which we can give them in their important, and often arduous, work.

Without attempting to discuss the details of a college chemistry course, arranged with a view to training the "best chemists", and without differentiating between a college and a university course in chemistry, there are one or two points to which I may draw your attention before closing.

To begin with, there is the question of the collateral subjects of instruction which a chemistry student should select. To-day we rightly assign an important place to physics and mathematics side by side with the study of chemistry, but it appears to me that our students should also be led to pay more attention to certain modern languages, particularly to German and French, so as to enable them to make use of important works and papers on chemical subjects in these languages.

Without a fair knowledge of these modern languages a student of chemistry can hardly do justice to that very important subject, the history of chemistry. The stately edifice of modern chemistry gains vastly in human interest when we closely consider the lives of the great men who have laid the foundations and helped to build it up, and when we read of the doubts which perplexed master-chemists of a past generation and study the record of their shrewd speculations. Moreover, when we are dealing with the many problems of modern chemistry, who will say that we can afford to miss the lessons which are to be learnt from the great Fathers of Chemistry?

It is interesting and instructive, for example, to read of the painstaking care which Berzelius exacted from his pupils. On 15th March, 1825, Berzelius wrote to Wöhler:—"Moses ist noch mit seiner Serpentinanalyse beschäftigt, die er im September anfing und nun zum achten male wieder macht, um zu lernen, nicht geschwind und schlecht zu arbeiten." (Moses is still busy with his Serpentine analysis, which he began in September and is now repeating for the eighth time, so that he may learn not to work rapidly and badly.)

It is worthy of note that among our South African students we find blood-representatives of practically all the nations that in the past have made chemistry what our science is to-day. The international heritage is free to men of all races who choose to avail themselves of it, but it is *our* heritage in a special sense.

On an Infectious Foot Disease in Sheep.

By Dr. A. Theiler, C.M.G., Acting Director of Veterinary Research.

I.

In May, 1910, we received from J. P. Meyer, Esq., of Rietvlei, near Johannesburg, two feet of sheep (comp. photo No. 1), with the information that he had been experiencing a lot of lameness among his sheep, which in some instances became so serious that he had to kill the affected animals.

The two specimens were referred to as No. 1 (coming from a case which had been in existence for a year) and No. 2 (from a case of a month's duration) respectively. Mr. Meyer stated that the disease commenced above the hoof and finally invaded the hoof itself.

The specimens were examined and the following notes were taken:—

Specimen No. 1 showed pronounced deformation in length and growth of the horn of the foot, probably due to an affection of the matrix. The matrix of the coronary band showed ulcers and a thick growth of fibrous tissue. It was apparently a sequel to case No. 2.

Specimen No. 2.—The skin of the coronary band was covered with a blood-stained, dry crustation and free from hairs; the matrix of the coronary band was thickened and tumified. The deformation of the horn was just commencing.

The microscopical examination proved the absence of the necrosis bacillus which was suspected to be present, but bacteria of different species were noted.

The cases were diagnosed as an inflammation of the skin, probably of an infectious nature. No definite opinion could be given as to the cause of the disease itself, although it was expected that some micro-organisms would be responsible for the inflammatory process.

In order to trace these organisms fresh cases would be required, so that the necessary experiments could be undertaken with living material.

Accordingly Mr. Meyer was asked by us to send a living sheep to the Laboratory, to which request he willingly complied, and forwarded us an affected sheep, which arrived here on 25th July, 1910. The description of the case was as follows:—

Sheep, Persian, No. 2763.—Lame on near front leg. There was an ulcerating wound in the coronary band, and on pressure a white pus appeared on several places in and on the border of the wound. The horn below the ulcer was loose, and it was found that the ulcer penetrated into the matrix of the lateral hoof wall, reaching almost as far as the sole. On the coronary band of the off hind foot was also an ulcerating wound limited to the coronary band and about the size of a sixpence. It was covered with a crust, on the margin of which pus escaped on pressure. Accordingly we probably had to deal with the same affection on both places, a first and initial one on the off hind foot and an advanced one on the near front foot.

II.

This sheep was kept under observation and, with the exception of an aseptic bandage, no treatment was applied. The object was to find out whether the affection as observed on the Persian sheep could be transmitted to other sheep by inoculation, and, if such should be the case, whether any specific organism could be found which, when inoculated into healthy sheep, would produce the same lesions.

On the 12th of July, 1910, two sheep, Persian (one not numbered, the other marked with red paint), were scarified superficially on the coronary band of the near fore foot with pus collected from an ulcer on sheep No. 2763.

Persian sheep No. 2234 and No. 2168 were scarified between the claws of the near hind foot, and the same material was placed on the superficial wound. All the feet were then bandaged with an aseptic linen bandage in order to prevent any outside contamination.

Two days later the examination of the feet revealed the presence of a swelling, hot and painful. There was a crust on the place of operation on the " red paint " sheep and on sheep No. 2234. In the unnumbered sheep and sheep No. 2168 the place of operation was tumified, and on pressure small drops of pus escaped on several places where the scarification had been made.

On the 14th of July, 1910, the " red paint " sheep and sheep No. 2234 showed a wound with a superficial necrosis. The " no number " sheep and sheep No. 2168 were discharging pus on pressure.

On the 15th of July, 1910, sheep No. 2234 had a superficial ulcer between the claws, about the size of a sixpence in circumference, with a yellow deposit on its surface.

Sheep No. 2168.—The place of operation was much swollen and very painful, and on pressure pus escaped at several places.

" *No number* " *sheep*.—The wound between the claw reached about the size of a sixpence in circumference, and was discharging pus very freely.

" *Red paint* " *sheep*.—The place was much swollen and painful, and on pressure pus and blood escaped.

In the course of the following days all the wounds sloughed the skin and an open ulcer appeared, discharging pus.

In order to prove the infectiousness of the discharged pus in the wounds of the foot for other parts of the skin, it was decided to smear the pus on to scarified wounds on the forehead. Each sheep was treated with its own pus. In the course of the next few days the same symptoms were noted on the head, viz., a painful swelling, first with blisters of the surroundings and redness, painful when touched, and the formation of pus, which on pressure escaped, and finally sloughing off the skin on the seat of operation as far as the inflammation had formed an abscess.

There was accordingly no doubt that the cause of the ulcerating wound was due to a virus which propagated when transplanted into the skin. It remained to isolate the organism to obtain it in a pure state, and then again to transplant it in order to produce the same lesions as described beforehand.

III.

The Micro-organism.—When the pus of the original sheep (but particularly that of the inoculated one) was spread out in a smear

preparation and stained in the usual way, a small bacterium could be seen to be present in great numbers, but there were also other bacteria present, viz., cocci. When the gram method was applied, the small bacterium took the black stain, and by this means its size and numbers could easily be traced. Pus of the inoculated sheep was spread on the slanting surface of a Martin agar tube, when, after a day or two, transparent droplets appeared, growing not larger in size than about that of a pin's head. The droplet was transplanted on to a new tube of slanting agar, and, by means of the condensed water present, spread all over the surface. Over this a thin transparent film grew, but never developed into any thick layer; it remained practically stationary after it had grown into the film. The film consisted of a dense aggregation of very fine droplets. When this culture was examined under the microscope it proved to consist of the above-described bacterium in a pure state.

Transplantations were made on different media, but there was no improvement in the growth observed in the originally used Bouillon-Martin-Agar.

In order to obtain sufficient culture material for inoculation purposes, bouillon was added to the slanting agar containing the growth, which was then detached and developed freely in the liquid. The emulsion was then applied to the scarified surface on the skin of the coronary band, similar to the original transplantation, but out of four sheep only one developed a typical ulcer. It is very likely that the material in emulsion form was not viscid enough to adhere in the wound. Accordingly it was decided to inject a few drops of the culture emulsion into the skin of the forehead of the sheep. The place of injection was shaved and disinfected, as was done in the case of a control sheep, which was, however, not injected. On the place of the injection a swelling appeared in the inoculated sheep with an inflammation of the skin, the swelling rising above the surroundings and reaching about the size of a hazel nut. The swelling burst in the course of the next few days, and a sanguilent pus escaped when slight pressure was applied. Then an ulcer developed, discharging pus, which gradually healed up.

The microscopical examination again revealed the presence of the typical bacterium abounding in pure culture. The control sheep did not show any reaction. Thus it appears that the bacterium is responsible for the formation of this ulcerating disease, which, accordingly, need not necessarily be limited to the coronary band of the foot, although that part represents possibly the seat of predilection, probably because wounds frequently occur there.

A disease of sheep, known as "foot-rot", is sometimes very frequently met with in rainy weather on wet places. It must also be due to some organism which, under the above-mentioned conditions, finds its best chance to enter into the skin of the foot and to develop there. It remains yet to be seen whether the bacterium just described is also responsible for that affection.

IV.

Treatment.—The foot evil described does not require any specific treatment except one which applies to all ulcerating wounds, viz., thorough cleaning of the wound, preferably by means of warm water

and a disinfectant, such as carbolic acid, 3 per cent.; Pearson's antiseptic, 3 per cent., etc., and a dressing of the wound by means of a disinfecting and astringent ointment. A cheap and effective ointment can be made as follows:—

Powdered bluestone, 10 parts.
Fat, 70 parts.
Stockholm tar, 5 parts.

When the ulcer has penetrated into the matrix of the hoof and the horn becomes detached, it is advisable to cut it away and to clean and dress the wound underneath as mentioned before. When a luxuriant growth or unhealthy granulation develops cauterizing with nitrate of silver can be recommended. It is sometimes noticed that although the wounds have healed perfectly there remains a tenderness on the feet, the sheep still going lame. This will probably disappear when the horn has grown over the wound in the hoof.

On an Infectious Foot Disease in Sheep.

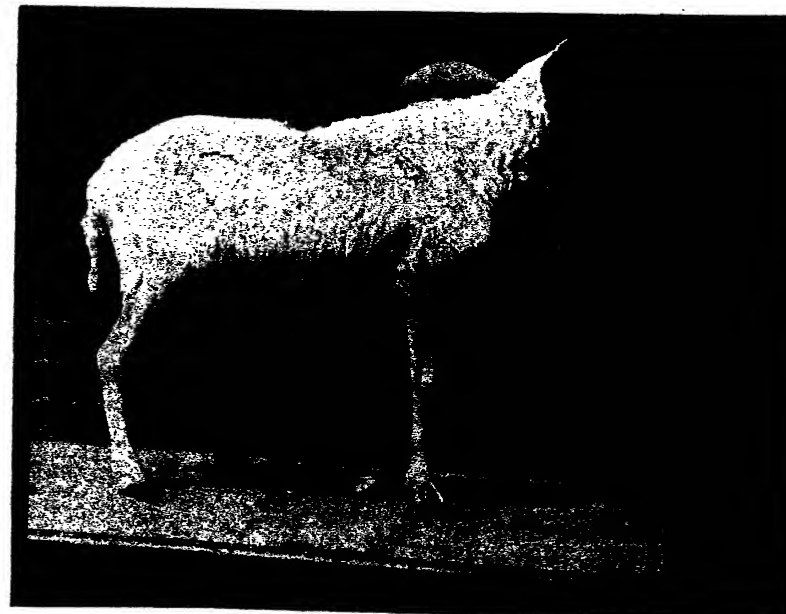


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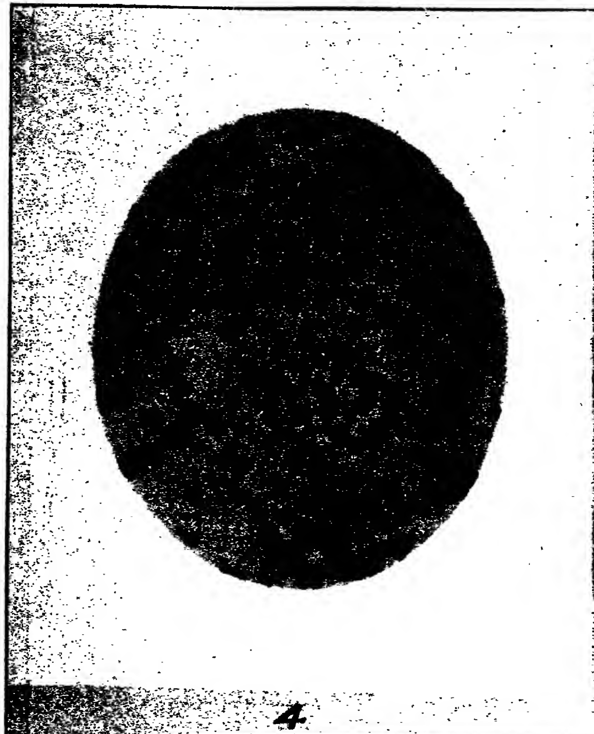
Photo No. 1.—Photograph of the two feet forwarded by Mr. J. Meyer. (Right side) Specimen No. 1. (Left side) Specimen No. 2.
Photo No. 2.—"Red Paint" Sheep.

On an Infectious Foot Disease in Sheep.



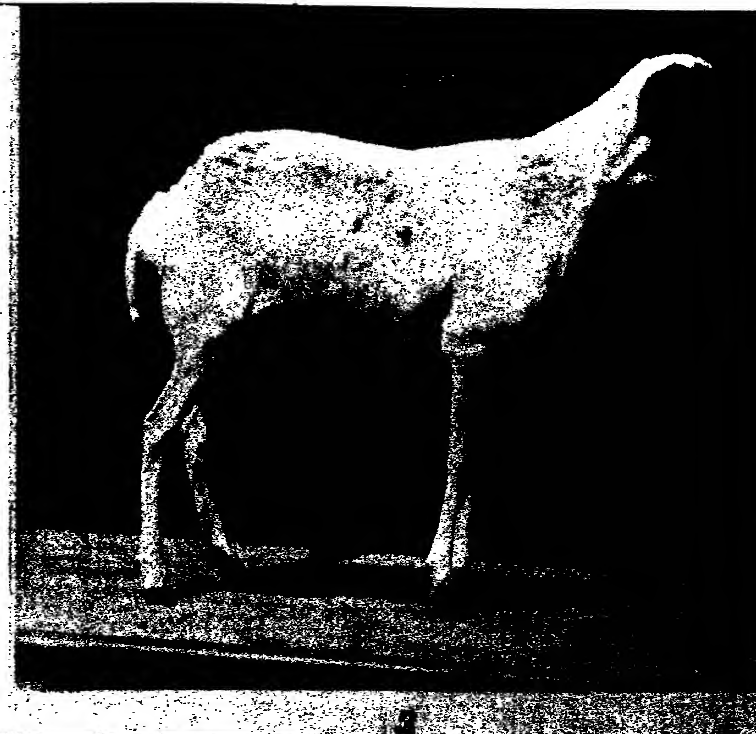


Photo No. 3.—Sheep No. 2168.
Photo No. 4.—Micro-organism of the disease (from a pure culture).

Dipping and Tick-Destroying Agents

By Lieutenant-Colonel H. Watkins-Pitchford, Government Bacteriologist, Natal.

SYNOPSIS OF PREVIOUS REPORTS.

The following is the third of the reports prepared by Lieut.-Col. H. Watkins-Pitchford, Government Bacteriologist, Natal, on Dipping and Tick-Destroying Agents. The previous reports were published in the *Natal Agricultural Journal*; and in view of the fact that the majority of readers residing in the Cape Province, Transvaal, and Orange Free State, as well as in other parts of South Africa, have not had the opportunity of acquainting themselves with the full details of Mr. Pitchford's investigations in connection with dipping, and also to serve as an introduction to the present report, the following summary has been prepared of the results of investigations contained in Mr. Pitchford's former two reports.

First Report.—The object of this report was to show the efficacy of certain preparations intended for the dipping and spraying of cattle, the main object of the inquiry being to ascertain the frequency with which such dipping agents could be effectively applied for the destruction of ticks without risk or detriment to the animals concerned. The conclusions arrived at, therefore, were based not only upon the reliability of a dip as a tick-destroying agent for general use at short intervals, but chiefly upon its ability to permit re-application at a short interval without incurring damage to the animal system. The tick-destroying agents tested were as follows:—(1) Cooper's "Tixol"; (2) McDougall's Dip; (3) Quibell's Dip; (4) Cooper's Dowder Dip; (5) Demuth's Dip; (6) Newton Chambers' "Izo-Izal"; (7) Thomas' Dip; (8) Holmes' Paste Dip; (9) "Ialine Sheep Dip; (10) Electrolyzed Sea-water; (11) Arsenite of Soda; (12) Erkenbrach's Paste Dip; (13) Alderson's Dip; (14) "Laboratory Dip".

The question of interval between dippings has been considered of much importance in view of the life history of the tick, especially of the brown tick (*Rhipicephalus appendiculatus*), so frequently responsible in one of its developmental stages for the transmission of East Coast fever; and the interval, therefore, between applications of the various solutions was made as short as possible in the investigations in order to prevent the tick surviving and thus leaving the body of an infected host and further propagating the disease. The problem of killing all parasites upon a beast every few days without involving the beast itself in danger by direct or cumulative effect of the repeated applications, proved a difficult question. Arsenic, which is the chief constituent of most of the dips, is a strong irritant to the skin, and in addition is capable of occasionally storing up or accumulating its poisonous properties and suddenly exerting such in the form of acute arsenical poisoning.

The desirability of frequent cleansing of animals at short intervals led to the interval of four clear days (i.e. every fifth day) being determined upon as the shortest practicable time to which such interval could be brought with due regard to the safety of the beast and the destruction of ticks. This minimum time of four clear days was, however, found to be too severe a test for the majority of the preparations under examination to conform to. This difficulty led to the attempt to produce a dip suitable for use every five days without injuring the animals; this has now come to be known as the "Laboratory Dip". This dip has been well tested, and cattle have been put through the solution for sixty days at regular intervals of four clear days, the ticks being destroyed and the cattle maintaining their usual health. Furthermore, as far as Mr. Pitchford has been able to judge, cattle can be worked with safety directly after dipping in this "Laboratory Dip".

The only dip besides the "Laboratory Dip" which came before Mr. Pitchford's notice as being capable of frequent, safe and satisfactory application even to working oxen, was that used upon the Nel's Rust Estate (Natal). This dipping fluid is a modification of the Queensland dipping formula.

No attempt was made to compare the cost of the various preparations or to judge of the same from any preferential standpoint. All that was attempted was to ascertain the tick-killing properties of the preparation in question and the safety with which applications of the same could be made.

Second Report.—The second of Mr. Pitchford's reports dealt more with the manner in which the effects of a dip are exerted both upon the animal economy and upon the tick itself. More particularly, the observations recorded were designed to prove that the

advantages of the adoption of a short-interval system of dipping are not merely the advantages to be expected from a more frequent immersion of the beast and the more frequent "mechanical" killing of the ticks upon its body by such immersion, but also the advantages of the striking secondary results which are found to attend the adoption of short-interval dipping. These secondary results appear to be of the nature of an habituation or tolerance of the tissues of the animal to the presence of arsenic. "The effects from these frequent dippings appear to accumulate within the animal's system, producing as they accumulate a corresponding degree of tolerance or habituation on the part of the animal, the deeper layers of whose skin gradually become temporarily charged so to speak with arsenic so as to render the beast poisonous to any ticks which may become attached in the intervals between the dippings." The excretion or throwing off from the system of the accumulated arsenic is, however, a rapid one, and it is only by the short-interval dipping or spraying that this loss can be compensated, if the animal is to be maintained in its maximum tick-killing condition; dipping at intervals of ten days or a fortnight means that the animal simply acts as the vehicle by which ticks are collected and conveyed to the dipping tank, there to be killed by submersion in an arsenical fluid. Gradual habituation is, however, necessary, but tolerance becomes rapidly established, and a few weeks only are necessary to accustom an animal to submersion in the "Laboratory Dip" every five days without any discomfort. It appears, however, to be some time after this point has been attained before the maximum degree of tick-killing capacity is reached, when the animal appears to be incapable of further accommodation, having reached a point, so to speak, of saturation. This accumulation of arsenic is observed to be not a mere mechanical deposition or passive soaking, but rather a vital and active process; and the observation is further borne out by the fact that any arsenic in excess of the maximum content is eliminated from the skin, the elimination taking place through absorption by the blood-vessels which are contained in its deeper layers, such excess of arsenic appearing shortly afterwards in the urine. When it is considered that it is into this deep layer of the skin that the tick thrusts its mouth parts and obtains its nourishment, the significance of being able to establish and maintain a supply of arsenic at such a point of attack is seen. It must be understood that it is not the circulating blood that is poisonous to the tick; destruction is effected by strictly local influences, and consequently the practical point which Mr. Pitchford emphasises is that all parts of an animal to which ticks can gain access must be subjected to the thorough application of the arsenical solution at short intervals. If this point is not observed, regions of the body will remain open to attack, and may prove the one small vulnerable point of attack, through which infection may become established. It has been observed that, of cattle put through dipping tanks, completely effectual immersions will not, as a rule, be found in much more than 80 per cent. of the animals. "These points," Mr. Pitchford remarks, "should be remembered in routine dipping, otherwise areas of skin, such as the root of the tail or the inner ear (which are actual 'predilection sites' for the tick) will permit escape of the ticks there attached, and prevent the establishment of any habituation of the tissues at such spots. The smearing or hand dressing of these parts by oily preparations is a useful procedure, so far as it acts as a deterrent to tick approach, but if the protection of the animal is to be made as complete as possible such measures should not be made to supersede the application of the dipping fluid itself to the parts in question. If this thorough application of an arsenical solution to all parts is ensured, either by spraying or effectual dipping (or a combination of both processes easy of application), it will be found that the need for special oily dressings, etc., will be, in a great measure, done away with."

PART III.

PREVIOUS reports on the above subject have been designed to urge the adoption of the principle of a system of dipping at a shorter interval than usually practised, and also to pass in review the various existing proprietary dipping mixtures with a view to ascertaining their suitability for frequent application.

Our knowledge of the disease East Coast fever and of the life history of the brown tick—the chief transmitter of the disease—shows clearly that if we are to make sure of destroying the tick—and with it its infectious germ—we must attack it during the brief space that it spends engorging itself upon the blood of its host, the ox, and if we fail to ensure its destruction during this brief interval it will, by its survival, involve us in the risk of the perpetuation and extension

of the disease. If, therefore, we are to make sure that no tick is to survive which once gains access to its host, our destructive attacks must be so timed as to leave no interval during which a tick may engorge itself and—potent for future mischief—leave the body of its host.

When we learn that a brown tick may complete one of its periods of attachment to its host in so short a period as three days, or even less, we shall see that our attacks (if we are to cut off all possibilities of escape) must be at correspondingly short intervals.

Fortunately, it happens that this minimum period of attachment is rarely found to obtain the time of the stay of the immature forms of the brown tick (the larvae and nymphs) being generally several days longer than above, a tenure which brings them within the destructive effects of the recently devised system of short-interval dipping. The repressive influence of the short-interval or "five-day dipping" upon farms where disease has appeared has 'een amply demonstrated in the past, such instances being in strong contrast to cases where reliance has been placed upon the usual system of dipping at intervals of ten days or a fortnight.

Even where the short-interval system has been practised, cases of infection sometimes continue to occur from time to time under conditions and in places where no question exists of reinfection or reintroduction of the disease from outside. Such instances prove the possibility of the escape from an infected beast during the intervals between dippings of a certain number of ticks, and these ticks have served to keep alive and re-establish the infection after a lapse of many weeks or even months. Such outbreaks or reappearances of the disease are rare where the system of frequent dipping has become thoroughly established, for in such a case the possibility of the survival of the tick is decreased by reason of the "residual" or continued destructive effect exerted by cattle which have been frequently dipped, an effect which, while not always proving immediately fatal, is still frequently able to prevent the moulting of the tick and the arrest of its infectivity. This point, which was dealt with fully in Part II of this Report, will again be reverted to below.

The possibility of the disease being thus able in certain cases, in spite of the short-interval dipping, to reappear in a herd from which it seemed to have been eradicated, and the public inconvenience and private disappointment caused by such reappearance, led to the undertaking of the present work, in the hope that some system might be devised which would not only abolish this risk of recrudescence or reappearance of the disease, but would furnish a system by which its progress through a district or farm could be successfully opposed, or its ravages at least reduced to a minimum.

The main step in the solving of this problem was obviously the adjustment, if possible, of the principle of dipping to the life history of the tick, so that practically no chance should exist of any tick leaving its host, however short its stay, in a live (or uninjured) condition; but in order to adjust this point with exactitude it first became necessary to observe (by trial on a practical and ample scale) exactly when the danger of such escape commenced, a point of time which, of course, coincided with the shortest length of time spent by the tick on the body of its host. Reference to Schedule I will show how this point was determined, and the reason for deci ling that a period of seventy-two hours (or three days) was the longest interval

which an animal could be allowed with safety to remain in undisturbed possession of its ticks.

The prospect, however, did not seem promising of being able, not only to adopt a 72-hour period of dipping with safety, but also under such a system to maintain indefinitely from month to month without loss of condition the animal subjected to the process. The reader who is sufficiently interested as to the detailed steps by which this point was arranged may refer to the schedules. Here he will see that the successful adjustment of the composition of the dipping fluid was not arrived at without some trouble in the endeavour to ensure *(a) Safety in use* (Schedule II), *and (b) Destructive effect on the tick* (Schedules IV and V).

These two cardinal points of safety and efficiency depended mainly, but not entirely, upon the adjustment of the arsenical content of the dipping fluid. Previous experiments had shown (see Part I of this Report) the method by which that essential ingredient, the arsenic, in a dipping fluid could be so adjusted as to give the maximum tick-killing effect with the minimum inconvenience to the beast itself, and this efficient arsenical percentage was shown to vary with and depend upon the intervals elapsing between dippings, a very high percentage of arsenic being tolerated where the dippings were separated by a period of some weeks. Where, however, it was found necessary to decrease the interval, i.e. increase the number of dippings in order to meet the problem of the destruction of tick life in all its phases, it became also necessary to greatly reduce the percentage of arsenic in order to avoid damage to the beast. Fortunately it was found that such reduction could be made without materially interfering with the poisonous effect upon the tick itself. In this way the composition of the old forms of dip which often contained as much as 5 lb. of arsenite of soda to 100 gallons (for monthly use) was reduced, in the "Laboratory dip", to 2 lb. per 100 gallons, a fluid which was found capable of application every five days.

This result seemed to comprise the shortest interval at which immersion in an arsenical fluid could be safely and effectively undertaken, and the wide adoption of this so-called "Short-interval dipping", as stated above, fully justified itself both by the restraint of tick life following its adoption and the undoubted check which it has exerted upon the spread of the disease East Coast fever.

As a regular procedure in the clearing up of a farm from its ticks, and in the absence of East Coast fever it was recognized at the time that so short an interval as five days would add materially to the routine trouble of farm life and make a considerable call upon the time, if not the purse, of the stockowner. Where, however, the possibility of the advance of East Coast fever had to be encountered, it was thought that no interval would be likely to be deemed too short, or trouble too great, if it increased the chance of ultimate escape. An extra inducement was also held out to the progressive farmer to adopt the stort-interval system by showing that in so doing he would gradually render the poisonous effect of his more frequent dippings continuous from one immersion to another by reason of the accumulated or "residual" effect to be secured by such frequent immersion, thereby greatly facilitating the rapid clearing up of the farm besides this increased prospect of holding in check the infection should it become introduced. Such considerations taken together would, it was thought, fully warrant the adoption of the short-interval

system, which, though somewhat irksome in its routine application, held out thus the prospect of a double ultimate advantage.

The fact is mentioned above that modified outbreaks continue in some cases to occur on farms where this process has been in use, showing the occasional escape of some forms of tick life from their infected host in spite both of short-interval dipping and its accumulated effect.

Our knowledge of the brown tick and its agency in the spread of the disease shows us that in such recurring outbreaks only the larval and nymphal forms of the insect could (after their escape from a sick beast and after moulting) be concerned in the production of future infection.

It is therefore obviously against the larva and nymph that our offensive measures must be directed in the endeavour to prevent their future development into forms in which they may become capable of spreading the infection.

As has been shown in Schedule I, the period of stay of these possibly dangerous immature forms upon a beast has been found to be as short as three days, a point which has been demonstrated by previous observers. The above-mentioned schedule shows, however, the possibility of larvae and nymphs maturing and leaving their host even before the expiration of this period of seventy-two hours, seventy hours, sixty-eight hours, or even less, sufficing in some cases to permit of escape and the possibility, if infected, of transference of the disease.

Even the shortened interval of a three-day dipping system, therefore, would appear to be inadequate to guard against all the possibilities of spread of the disease, and it would seem that even such readjusted dipping measures must fail by a few hours in ensuring certainty of result.

Fortunately, however, we are able to cut off all chance of escape by preventing the attachment of the immature tick for its full period of seventy-two hours or even sixty-eight hours. Reference to Schedule VI will show that, while the adult and hungry tick will attach itself readily to the newly-dipped beast, both the larval and nymphal forms are deterred from biting for a period of at least some hours, an effect probably due to the paraffin present in the composition of the dip. The exact period of this revulsion or deterrent effect was not determined with exactness, but it is of such a length as to amply cover the three or four hours of the seventy-two hours' interval which the dipping leaves unguarded. Proof of this fact will be found in the experiment described later in paddocks D and E, where the infection of these paddocks must have been inevitable had the innumerable nymphs and larvae present been able, in even a single instance, to use the whole interval of seventy-two hours for the purpose of their development, and so effect their escape, as in the case of the early-maturing ticks in Schedule VI.

The destruction by the system of five-day dipping of all *adult* ticks should be certain, owing to the length of time they remain attached to their host, a period which will ensure a second immersion in cases where attachment persists. Where, however, the period of attachment, as in the case of the larva and nymph, may be so short as to permit engorgement and escape between one five-day dipping and another, the problem is obviously only to be met as suggested above by the adjustment of the dipping process to an interval which will render such escape impossible.

In view of the fact that the percentage of arsenic requisite to produce a destructive effect upon the tick had already been adjusted with some nicety it did not seem at first hopeful that this percentage could be very materially reduced) so as to permit of a still shorter interval being adopted) without effecting the efficiency or tick-killing power of the dip.

Fortunately, however, it happens that the larvae and the nymphs—the forms of tick life which we are particularly interested in destroying—will succumb when exposed to an arsenical solution considerably weaker than that necessary to ensure the death of the adult tick, a fact which seemed to render it possible, without detriment to the host, to reduce the interval between dipping so as to ensure the destruction of all larvae and nymphs, however short their stay. If this could be effected, the completeness of the destruction by one dipping of all the adult forms attached to the host might for the following reasons be viewed with comparative unconcern.

The adult female will, before becoming completely engorged, remain attached a considerable length of time and so be subjected to two or even three dippings before being ready to leave its host. How rarely after one dipping such female forms remain on their host uninjured and go on to full distension, may be judged from the fact that out of over 10,000 adult ticks actually counted throughout these observations on cattle being subjected to the new process only 69 partially distended females have been found.

Careful detachment of these distended ticks, and observation under favourable conditions, shows that, in the majority of cases, the dipping arrests the process of egg-laying, while of those eggs which are laid only a small percentage are capable of subsequently hatching out.

Where two immersions in the dip had been experienced by the distended tick none of the eggs hatched, while only about 2 per cent. of such ticks were able to lay at all, and this to an imperfect extent.

As, however, the laying and hatching of the eggs of the brown tick is without significance—in so far as the transmission of East Coast fever is concerned—the escape of an occasional female form from the effect of the dip is a point of no interest, except perhaps to the farmer who is seriously undertaking the eradication of all forms of tick life from his farm (and in such a case reference to Schedule III will show the small degree of importance to be attached to such escape).

The paddock referred to in this Schedule III (to which future reference will be made) furnishes a practical confirmation of the above assertion, for in this experiment had any appreciable and regular escape of distended ticks taken place from the herd grazing this paddock, no such striking diminution of the tick life on this ground could have been looked for or experienced. There remains then the consideration of the importance of the other adults after attachment to their host, viz., adult males and adult but unengorged females.

To these forms not even the slight significance can be attached which we accord to the distended female. It is of course true that such ticks may produce the disease if they have passed their nymphal stage upon a sick beast. But—as previous observers have shown—with such attachment their power for mischief ceases, nor are they able, even should they resist the effect of the dip, to keep alive further infection of the veld, a point of importance in the repression of the disease.

The actual lethal effect of the newly-arranged dip upon these mature forms is shown in Schedule IV. It will be seen that an average of 70 per cent. are killed by the one immersion in the interval of seventy-two hours before the repetition of the dip, while the remaining 30 per cent. succumb before the next dipping is due, within a period altogether of six days.

A much more marked destructive effect can be obtained by the repetition of the dipping process at intervals of forty-eight hours (see Schedule V)—a perfectly practicable procedure with the dip-fluid which is noticed below—but there is no valid reason for hastening the killing of these adult forms in so far as East Coast fever is concerned.

While for the above reasons it will be seen that we need not arrange our dipping fluid so as to kill rapidly all adult ticks (for as we have shown not only are they negligible but their destruction is ultimately assured), it will be of the utmost moment for us to catch the elusive nymph and larva which, by escape, may maintain alive the infection of the veld. This result, fortunately, we are able to accomplish by lowering the strength of our dip (without lowering its essential efficiency) so as to permit of as frequent a dipping as will ensure the immersion of every tick—large or small—once attaching itself to a beast.

In the "three-day" dip the arsenical strength has been lowered until only one pound of arsenite of soda (of a standard strength of 80 per cent. arsenic trioxide) is used in the preparation of 100 gallons of fluid (a reduction in the arsenical content as compared with the previous Laboratory dip* of 53.5 per cent.).

This fluid—weak though it is in its essential constituent—is capable of fully meeting the two cardinal requirements mentioned above, viz., efficiency in tick destruction and safety in repeated use.

In the composition of this dip both the soft soap and the paraffin have been retained as necessary.

Endeavours have been made in certain quarters to do without these ingredients in the "Laboratory dip" and use a simple solution of arsenite of soda in the dipping tank. Part I of this report showed that the use of arsenite of soda alone was investigated and abandoned as being too caustic in its effect upon the skin for short-interval dipping. Reference to Schedules II and V of the present report will also give details as to the use of an arsenical dip at short intervals without the addition of soap and paraffin. It will be seen from the table that not only was it impracticable to use the arsenite solution alone (by reason of its irritating nature), but, further, that it failed to kill the ticks brought into contact with it as efficiently as the complete formula.

It is essential then for the purposes of the present short-interval dipping system that no alteration be made in the composition of the dip if the two points insisted upon above, viz., safety and efficiency, are to be assured.

While it will be found that the formula given (the exact manner of compounding and mixing of which will be found in Schedule VII) will be efficient in its general results, there is one part of the body—the ear—which calls for special treatment. By using the old Laboratory formula the ears were effectively cleaned, provided care was taken to

* The new fluid contains only ·08 per cent. of arsenic trioxide as against ·17 per cent. in the original Laboratory dip.

ensure the entrance of the fluid by complete submersion of the head. Where however the more diluted dip is used it is found that occasional nymphal ticks can survive the process if they have begun to swell or engorge before the dipping takes place. Only such ticks however as have attached themselves far down the meatus or passage of the ear appear thus to occasionally survive. The removal of the ear of a dead and tick-infested beast close to the skull will show in some cases numerous nymphs attached to the wall of the passage capable apparently of completing their engorgement in that position and escaping in due course to complete their life cycle as adults.

Probably the inaccessibility of such a region, together with the fact that the narrowing walls of the passage are coated with a waxy substance (cerumen) tends to prevent the penetration or efficient contact of the dipping fluid, and where this latter—as in the dip in question—is of low arsenical strength, ticks in such a situation may well survive the ordeal of one or even two immersions.

Although none of the engorged nymphs removed from this situation after dipping or spraying have proved able to moult, the fact that many survived for a considerable period points to this spot as a weak one in our defences. It was therefore determined to undertake the separate treatment of the ears, a procedure which, though increasing the routine trouble, seemed to render assurance doubly sure.

The chief difficulty encountered in this routine swabbing of the ears was the fact that the delicate lining membrane of the auditory canal would not tolerate the necessary frequent application of any preparation of an irritant nature. The usual coal-tar derivatives mixed with grease (a compound widely used for this purpose in the past) had to be abandoned in favour of something easily obtainable, as cheap, and less irritating. This desired material was found in due course and, after extended trial, has given excellent results, killing all forms of ticks with rapidity and certainty and not producing any irritation of the lining membrane of the ear however frequently applied. The homely character of the prescription and its ready availability will not be found to detract from its usefulness. Details of preparation will be found in Schedule VIII.

It now remains to show the results given by the above preparations in the practical tests of prevention and suppression of East Coast fever, and also in the eradication of tick life from infested areas.

At the end of this report will be found a map or diagram showing the sub-division into paddocks of a portion of the town lands* of Maritzburg. (See Schedule IX.)

These paddocks—which comprise a considerable area—are of varying shape determined by the purpose for which they were constructed and to some extent also by the contour of the ground. The northern or top boundary is some 750 feet higher than the southern fence along the banks of the spruit. Several wooded kloofs run north and south and divide this area, while along the lower grounds a good

* The accommodation at the laboratory for a work of this nature being quite inadequate, the Corporation of Pietermaritzburg was approached and, the requirements of the case being explained, permission was asked for the use of as much as was found necessary of the town lands contiguous to the laboratory for the purpose of carrying on this experimental work on an extended scale. It is with much pleasure that I am able to acknowledge the ready sanction which was accorded to the request, and it is due in no small measure to this helpful attitude on the part of the municipal authorities that the following observations were able to be undertaken and thus recorded.

deal of marshy ground exists. The vegetation along the southern part of the paddock marked A is very dense, while most of the paddocks have considerable stretches of old (last year's) grass.

It will thus be seen that the ground chosen presented features representative of an average farm as regards tick habitat, differences in elevation, etc.

In Schedule IX (map) it will be noticed that certain of these paddocks are surrounded by double lines of fence. This double fencing was undertaken chiefly to ensure the isolation of such paddocks from adjoining ones as well as to provide means of access. In the paddocks B, D, E, T, H, and F, active infection existed, and it was part of the scheme of experimental work to demonstrate or disprove the possibility of the extension of the disease by what might be called natural means, i.e. the crawling of infected ticks from one enclosure to another. The distance between these double lines of fence was determined on after a preliminary experiment, undertaken to show the actual distance travelled by the most active form of tick life—the hungry adult. The results of this experiment will be seen in Schedule X in which a diagrammatic representation of the distance and rate of travel is shown. The schedule shows, that of 770 active hungry ticks the furthest migration noted was twenty yards, the great majority coming to an apparently permanent rest within half this distance from the liberation point.

In placing the distance at thirty yards therefore as the interval for the double fences it was thought a safe margin was allowed, the correctness of which opinion was borne out subsequently as no case of the transmission of the infection from any one paddock to another has occurred across this space (a point which will be noticed below in speaking of the means of transference of the infection).

Provision for isolation by distance having been as far as possible made, the fences as shown in the map were erected so plotting out the area into spaces approximately of the shape shown. Each of these paddocks designedly enclosed certain patches or strips of old grass, but the greater part of each of the enclosures comprised good growing grass which rendered artificial feeding unnecessary throughout, experiments lasting approximately from September, 1910, to the end of March, 1911.

A good number of ticks existed upon the ground thus enclosed, a number which can be approximately judged by the average daily number picked up by the herd when commencing to graze paddock A (see Schedule XII).

In paddocks D and E, however, it was the intention to ensure a degree of tick infestment as gross as possible, and for this purpose the hatching of tick eggs was arranged on a large scale so as to ensure the liberation of some millions of larvae of the brown tick. Distended females were collected in numbers and placed in many large flat glass jars (about thirty-five in each vessel) and kept in the Laboratory buildings. The average number of eggs laid was about *6000 per brown tick. When the eggs commenced to hatch the glasses containing them were uncovered and placed in the midst of patches of long

* These numbers were computed by weight—a sufficiently accurate method for the purpose in hand, the average weight of 100 Brown tick eggs is about 5 milligrammes, a single egg weighing ·05 milligrammes. or approximately 1,000,000 eggs to 1 ounce. Larval ticks shortly after hatching were found to weigh ·0026 grammes per 100 approximately, a weight of only about half a grain to 1000 ticks.

grass under proper shelters to keep off direct sun and rain. A gross infestment of the veld was thus ensured, the ticks rapidly attaching themselves and going through their various stages on the cattle running in the paddocks so infested.

In this way the natural condition of a grossly infested veld was simulated as closely as possible, and the cattle in these paddocks (D and E) were maintained under conditions of infestment—without restraint by dipping—such as they would experience if grazing naturally on badly tick-infested veld.

The main intention of this experiment was—by the adoption of the "three-day" dipping—to prove the possibility of introducing beasts suffering from the disease East Coast fever into such paddocks (amongst healthy animals and amidst countless ticks) without incurring the risk of spreading the disease or contaminating the veld.

All the elements of a fierce outbreak would thus be assembled together and the introduction of a single infectious tick would probably prove the spark producing the conflagration.

Before, however, this critical experiment—which by failure would involve the loss of a number of cattle—was undertaken preliminary experiments were decided upon. These "limited liability" experiments were undertaken with the object of determining whether a tick-infested sick beast is able to contaminate the ground upon which it stands if it is sprayed at intervals of seventy-two hours. Such preliminary experiments were carried out as follows:—Two beasts were infected with East Coast fever (by turning them into a small infected experimental paddock kept for the purpose of producing the disease when necessary). As soon as these animals reacted they were removed from this paddock, sprayed with the three-day dip and tied up for several days (until free from ticks and until the specific organisms appeared in their blood and gland juice). They were then taken to certain spots in paddock H (see map, spots marked with a * distant at least 50 yards from each other) and were there picketted and at once infested with numbers of brown ticks in all stages of development. The area of ground therefore which would become contaminated by falling ticks would be at first limited to the circle described by an animal in walking round its picket peg.

At noon upon the 4th day (seventy-two hours) after being placed on these spots the animals were removed to a little distance and again sprayed with the three-day dipping fluid. Here they were allowed to stand for an hour and were then removed to two fresh sites and again picketted, while the neighbourhood of each original spot of occupation was at once fenced in. After a further lapse of three days the procedure was repeated, the beasts being removed and sprayed and the spot upon which they had stood enclosed.

The disease usually proving fatal on the third spot thus occupied the carcass of the animal was skinned and removed, the hide being left where the animal died, a spot which was again fenced in.

The above experiment was then repeated on exactly the same lines, using two other infected animals to control the observation of the first, and reduce the risk of coincidence or insufficiency of data.

As a variation of the same experiment two further animals were taken and allowed to remain in the infection paddock until they showed the organism in their system and were heavily infested with ticks. They were then sprayed as usual but no time was allowed for the beast to become cleaned of its numerous ticks. In this condition,

while grossly infested with all forms of tick, both mature and immature, they were pegged out on plots in paddock H with the above cases, and were treated in a similar manner to them, being sprayed and removed to fresh ground every three days as long as life lasted.

After the various enclosures (at distances of 50 yards from each other) upon which these animals had been confined and died, had remained closed up for a minimum period of one month, they were opened and a healthy beast was placed within each enclosure.

The object of the above preliminary experiment therefore was to secure an answer to the question:—

Can a sick and tick-infested beast convey the disease or contaminate the veld if sprayed every seventy-two hours with the three-day dip?

It is obvious that if any ticks had been able to escape unharmed after feeding on these sick beasts, the ground or plot upon which the latter were tied and its immediate neighbourhood would in due time become dangerous to a healthy beast subsequently confined upon the same plot.

1. Thus if no appearance of the disease took place on those plots first occupied by animals which were brought on to the ground sick but free from ticks (and were then infested and allowed to remain unsprayed for a period of seventy-two hours) the conclusion is justified that no infectious forms could have had time to engorge and leave their host before the removal of the beast to the next plot.

2. Further, if the second plot of ground occupied by an infested and sick beast remained uninfective when healthy beasts were subsequently confined upon it, the inference would be justified that the spraying process undertaken when the beast left the first plot at the end of a seventy-two hours stay had sufficed to arrest the disease.

3. Similarly if no infection of the first or subsequent plots followed the presence of beasts placed there while not only sick *but harbouring all forms of ripe brown ticks*, it is obvious that the effect of the single spraying, given immediately before the occupation of the plots, sufficed to check the disease and prevent the development (though perhaps not the escape), not only of unfed ticks but of those already distended ticks on the point of leaving their host.*

The outcome of the above experiment was, briefly, that no disease developed on any of the plots where the test or control animals remained several months.

The question therefore was conclusively answered as to whether a sick beast (infested with ticks and harbouring organisms in his blood, etc.), could convey the disease or contaminate the veld if sprayed every seventy-two hours with the three-day dip fluid.

The final and controlling test was then hazarded under conditions as critical as possible. Paddocks D and E had been prepared as described, *ut. sup.*, and had been grazed for some months by a small troop of healthy cattle, ten in number (a number subsequently increased), which were intended for the purpose of another experiment (to be referred to below).

* In the case of engorged nymphs, which have received one spraying with or dipping in the three-day dip, the results are (as with the distended adult) not always immediately fatal. In many cases the normal period for moulting is greatly exceeded, and though life persists, examination of the interior of the nymph fails to show any evidence of the development within of the adult insect. Such a tick would, of course—however long it retained its vitality—be quite incapable of any further infective action.

As previously described, excessive tick infestment existed, and had been promoted, and into these paddocks were drafted all the sick cattle as they became available from another series of experiments undertaken to show the general means of conveyance of the disease.

The only precaution taken at first was the spraying of the sick beast, or, if strong enough to travel and climb, its immersion in the dip-tank before it was placed in either the paddocks in question (D and E). Later, when the importance of guarding against the survival of ticks in the deep ear passages was recognized, the ears of all sick animals were dressed with the mixture described in Schedule VIII.

This process of spraying was carried out every three days, the sick beast being brought just outside the paddock for the purpose and returned shortly after the spraying was concluded. This procedure was continued during the life of the animal, and its hide was finally left to be investigated by the healthy cattle in the paddock. In this way, extending over a period of three months, ten sick animals have been introduced into these paddocks and allowed to die there. The ticks of the paddock have readily attached themselves to the sick beasts during the seventy-two hour intervals between spraying, and, although ample time has elapsed, no single case of the disease has been produced, the healthy and heavily tick-invested cattle grazing with the sick beasts indiscriminately as long as the latter lived.

No sick beast was introduced into these paddocks until it showed positive microscopic evidences of suffering from the disease.

The dividing fence between the paddocks D and E erected for the purpose of another observation was maintained during the early part of the above experiment, as into the lower paddock E were introduced two sick beasts directly after spraying and while carrying ripe ticks in their coats. The stringency of this latter test and the possibility of its failure seemed to render it expedient to maintain the fence between the paddocks in order, in the event of failure, to prevent confusion in interpreting the exact causes and results, and to limit probable loss. Such fears, however, proving to be groundless, the double fence was removed, and the paddocks were made one.

Situated on the fringe of the advancing disease, with multitudes of ticks upon the farm, the outlook of the stockowner has hitherto been a black one.

He has been told that if he can eradicate the tick the disease will not appear, but the eradication of the tick has seemed to him an impracticable procedure, or only to be attained after years of consistent dipping, while the disease is at hand and menaces him from day to day.

Now, however, his case will be more hopeful for—provided the disease has not yet reached him and his farm is fenced and he is willing to undertake the small amount of extra trouble consequent upon the adoption of the system below—there seems in the writer's experience no reason why the danger should not either be averted entirely or reduced to quite insignificant proportions, while at the same time the rapid clearing of the farm from all forms of tick life (a problem dealt with below) will more than compensate for the trouble involved in the carrying out of the system recommended.

In dealing with farms already infected, the difficulty is greatly increased, particularly where large areas, perhaps imperfectly fenced, have become contaminated by ticks falling from sick beasts. Where,

however, the disease is known or supposed to be confined to paddocks of limited size the eradication of the disease under the new system of dipping is not so serious a problem as it has been considered in the past, provided an adequate number of sheep or horses are available for the purpose.

The following experiment was designed to show both the length of time and the effort necessary to ensure the clearing up of the infection on an enclosed area of limited extent. The paddock in question marked G on the map, had, during the progress of the work described in Part II of this Report, been used as an infection paddock, i.e. an enclosure into which cattle could be introduced in order to infect them or test their immunity. The paddock was not large, its length roughly being from 600 to 700 yards, and its breadth irregular. The grazing, however, was good, and tick life abundant. Although the infectious nature of this paddock was looked upon as beyond doubt, it was thought advisable before commencing the experiment to demonstrate this point to certainty, accordingly on 1st November, 1910, a beast (No. 114) was shut in this enclosure and allowed to roam. The taking of its temperature for the first time on 12th November disclosed the fact that it had already become infected with the disease to which it shortly after succumbed. On 17th November a troop of horses, donkeys, and mules (numbering nineteen altogether) was placed in the paddock. These animals were driven up every three days and passed through the dip, being brought along the left-hand path or drive shown in the map to avoid risk of contamination of the path by which beasts from uninfected paddocks approached the dip. Before dipping, the ticks in the mane and tail of each horse, etc., were carefully counted, a procedure which though taking much time, was made in order to gauge the decrease of the ticks in the paddock from week to week.

During the first two periods of grazing (of three days each) the numbers of ticks brought to the dip were excessive, but on 25th November (the time of the third dipping) the average per animal had fallen to seventy-five, while a month later (28th December) it had been reduced to an average of four and a half ticks per horse for the three days, from which point it fell slowly to an average of about one tick per animal per diem, around which point it remained for some time before further constant reduction was noted. These figures will serve to give an impression as to the rate at which we can effect decrease of tick life. (Observations on the more systematic clearing of larger areas are given below.)

The first effort to gauge the time at which this paddock lost its infectivity was made on 14th December, when the ticks were still numerous. On this date a beast, No. 104, was introduced and regular observations were made upon its temperature after the tenth day. No reaction occurring, even many days after the termination of the usual period of incubation, a further animal was introduced, and the temperature of this beast also remaining normal throughout a month's exposure four beasts were introduced (19th January); and as these showed no signs of contracting the infection a further batch of five animals was turned in on 17th February and remained healthy. The quarantine of the paddock was then raised and the whole ground grazed over by the main herd without a case of the disease occurring.

The horses which had been used for the clearing up of the paddock were removed about the middle of December. Their condition had

not suffered, nor had any signs of skin irritation been produced by their frequent immersion.

In reviewing this instance it would appear that the period of occupation by the horses—from the 17th of November till 14th December, the time the first beast was introduced, a period of less than a month—was sufficient to divest the paddock of its infection. Further observations tending to confim the above finding were then undertaken. It has been above mentioned that certain paddocks, amongst which were B, J, and F (*vide* Schedule IX), were infected i.e. contained beasts suffering from the disease. Such paddocks were used for various experiments (which will be referred to in their place), and at the conclusion of such experiments the grounds of these enclosures remained and were proved to be in a condition of active infection.

From such infective paddocks the danger was progressively removed by a method of systematic grazing and dipping—in the case of paddock B by sheep, and in J and F by the nineteen horses, etc., used in the clearing up of paddock G.

In certain observations on the modes of transmission of the disease referred to below it is shown that an effort was made to concentrate the infection against the outside fence of paddocks D and E.* When beasts became very sick in either of the enclosures B, J, and F they were, towards the last, herded on the west side of their paddock in order to ensure the concentration of the infection as far as possible on the east side of D and E.

As these experiments became concluded an endeavour was made to clear up the infection from these paddocks by the herding of horses and sheep upon the areas known to be most highly infective. After several days of such concentration the troop was permitted to graze generally over the whole paddock, bringing to the dip every three days all the ticks attaching to themselves in that period.

In this manner it was found that quite a short period sufficed to eradicate the disease, e.g. in paddock J the horses were turned in on 8th February (an interval of six days); they were withdrawn and two control beasts were placed there, and have remained there since in a healthy condition. Paddock F was similarly treated, and after ten days grazing was stocked in a similar manner with a like result. In paddock B a flock of 150 sheep† was employed. These were herded at first along the borders of paddock D, where the infection was likely to be grossest (proof of the existence of the infection on this ground will be found in the record of another experiment), and after ten days grazing on and about the locality they were withdrawn (having been subjected to the process of dipping every week) and their place taken by four head of cattle, which, like the other test cattle, have remained uninfected.

The above facts, therefore, are brought forward to show that the hope of cleaning up localities where the infection is known to be restricted is not so remote as it has been generally thought. It is not suggested, however, that such measures as these described above can be adopted on unfenced farms over which the disease has swept

* A small * serves to show the relative spot in these paddocks where some of the infected animals actually died and where their hides were left.

† The use of the dip for sheep is dealt with later on.

unrestrained. Where, however, the invading disease has been fought rationally by segregation paddocks and the prompt isolation of sick animals, it is thought some method of systematic (not promiscuous) grazing, combined with short-interval dipping, will be found to hold out a good prospect of early and complete eradication, helping thereby the release of farms from quarantine restrictions which would otherwise have to remain imposed for lengthy periods.

In considering the deductions to be made from the above eradication experiments, the writer is aware that results achieved over such limited grazing areas as those available for the purposes of the experiment cannot be applied too closely to the problem of cleaning up paddocks or areas of great extent if the whole extent of such latter is presumably contaminated by the unrestrained wanderings of beasts in a state of infection and infestment with ticks.

It seems, however, permissible to hope that the results will be found capable of application on farms and premises where the conditions are favourable and the question of eradication one of the utmost moment.

Large infected areas will naturally require a larger number of unsusceptible animals to effect disinfection. In such cases the attempt is certain to be attended by success provided consistent efforts with adequate numbers are made, and the ground systematically grazed as illustrated in Schedule XI.

Reference has been made above to experiments having for their object the demonstration of the means by which ticks are conveyed and the disease East Coast fever is spread.

Various theories have been brought forward to account for the transmission of the disease from one locality to another. Men, animals, birds, vermin, hides, etc., have all been suggested as probable factors in the spread of the disease. Such conjectures, however, have not received, so far as the writer knows, the confirmation to be obtained only by observation under critical conditions.

It therefore seemed expedient to attempt the proof of some of the more prevalent opinions in order that, if proving fallacious, inconvenience and unnecessary restrictions might be avoided, while, if confirmed, increased care and more intelligent precautionary measures might be adopted.

Before, however, attempting the solution of the question of the spread of the disease by agents such as above it seemed desirable to inquire into some of the conditions governing the spread of the infection in its usual and more natural progress.

Reference to the map will show that paddock D is separated from the infectious paddock B by a single line of fence, while paddock E is surrounded on all its sides by a double fence. Around all the sides of both these paddocks wire netting (3 feet high and of ½-inch mesh) was placed with the intention of arresting the passage into them of ground vermin (rats, rabbits, etc.) from the infectious enclosures B, J, and F. Early in November these paddocks D and E were stocked with ten head of cattle, and it has already been stated how the infestment of these enclosures with ticks was secured. Active infection had been introduced on 28th October into the contagious paddocks B, J, and F, and the disease concentrated as far as possible by herding sick animals close to the western fence of these paddocks. Several beasts actually died along this fence line during the early days of

November, and their tick-infested hides were allowed to remain upon the spot.*

From the evidence afforded by entomological reports and by the results of the tests as to rate of engorgement, moulting, etc., given in Schedule I, infectious ticks could be expected to be present along this fence line towards the end of the month of November, and—provided the alley-way or division between the paddocks of 30 yards was insufficient—might be expected to make their presence obvious in paddock E some two or three weeks later, as no obstacle greater than a half-inch netting would oppose their entrance.

In paddock D, which was singly fenced, the eastern side of the fence line ran through a belt of last year's grass. A passage 6 feet wide was cut in this grass along the outside of the fence, i.e. in paddock B, and three sick beasts were picketted in the long grass at such a distance that, although they could not encroach upon this passage-way, they were within a few feet of it when at the full length of their short picket rope. These beasts were heavily infested with brown ticks in all stages, and they succumbed early in November.

The lower part of the paddock was then shut up to prevent possibility of artificial or inadvertent conveyance of ticks by men or animals from the long grass in B across the 6-foot pathway into D. In this case the distance barrier of 30 yards was absent, and the only defensive measure consisted of a passage 6 feet wide between the long grass in one paddock and that in the other.

The result of the above experiment is that no extension of the disease has occurred in either of the paddocks in spite of the fact that the grass on the outside of the fence was in a condition of virulent infection, a fact which later observations, *q.v.*, proved.

The preliminary experiments designed to lead up to the above critical tests should be borne in mind when attempting to review the significance of the final result. Schedule X shows the maximum distance likely to be travelled by the average hungry adult tick, and it is a fair inference that the immunity of paddock E was due to the establishment of the neutral zone of 30 yards.

Reference to the same schedule will also show the striking defensive effect which even a narrow strip of old grass will provide against tick advance. A month after the deaths of the animals in paddock B the edge of the strip of long grass showed many ticks visible, a much grosser state of infestment than existed elsewhere in this paddock. Frequent and exhaustive search was made, with due precautions, along the strip of closely-cut grass, but no tick was at any time discovered. It is evident therefore from the negative final result the infection was unable to spread from the edge of the long grass by reason of the unprogressive character of the tick.

The utility of the belt of old grass—as illustrated in the schedule and in the foregoing experiment—as a defensive screen should therefore be borne in mind, as it may possibly add to the resources of stock-owners who are eager to adopt every known means to check the advance of the disease from any recognized focus of infection.

The above observations may be considered as comprising in part the natural means of spread of the disease and its check or limitation under normal conditions. Practical observations, however, have

* These animals were, of course, not dipped or sprayed at any time.

shown the tendency of the disease to travel long distances in a manner quite inconsistent with the gradual and progressive invasion likely to be caused by a slowly-creeping insect such as the tick. These outbreaks clearly show the existence of some tick-transporting agency capable of carrying the carriers, and distributing them far distant from original foci of infection. With a view to determining with certainty some of these agencies of transmission the following experiments were made:—

Human clothing has long been under suspicion of mechanically carrying the disease from one spot to another.

In a country such as this where native pedestrians travel long distances, passing perhaps through many farms in the course of a single journey, and not always confining themselves to well-defined roads, etc., the agency of the native as an unintentional factor in the spread of the disease has long been suspected.

The following experiment confirms this suspicion:—

Paddock J (*q.v.*), in shape a parallelogram, barely 100 yards in breadth, was intentionally constructed to prove the point in question. It is isolated on all sides from risk of transfer of disease from contiguous paddocks by the double fence described before. About the middle of November two beasts (Nos. 105 and 106) were placed in this paddock, which was then permanently closed, the only access being by two stiles, one at either end. The disease had been previously introduced into paddocks B and F, and two animals had died at the commencement of November in the long grass at the upper portion of paddock F.

On 30th December (six weeks after the death of the first animal in paddock F) four natives were caused to walk directly through paddock F along an old kaffir path* and climbing the stile leading into paddock J, to walk through this enclosure into B, and then to return by the same route to F.

On 4th January this procedure with two natives was again adopted, and again on 10th January, the men passing straight through paddock J and returning again to F.

On 17th January the evening temperature of one of the test animals was 104.3, and death from typical East Coast fever occurred sixteen days later. The other animal contracted the disease a short time afterwards.

It is probable the infection was established by the first traversing of the paddock on 30th December, which, allowing a few days for the adult tick to find its host, would give a period of incubation of about fourteen days. The fact that no ticks were seen to attach themselves to the clothes or persons of the natives on this date cannot be considered satisfactory proof of their absence, as subsequent experiment tends to prove.

The appearance of the disease so promptly after the breaking of the quarantine is striking evidence as to the risk of conveyance of the infection which is incurred by unrestricted foot traffic through an infected area.

The conditions under which the experiment was conducted were of course exactly those which might be expected to lead to the conveyance of the disease, and it might be objected that such ideal

* This kafir path—shown on Map A by a dotted line—had been intentionally enclosed in the paddock for the purposes of the experiment.

conditions of spread rarely, if ever, exist in actual experience, or at any rate to an equal degree. While this of course is recognized it will be remembered that the point to be decided with exactitude was the possibility or otherwise of the spread of the disease by means of pedestrians, a theory which now must be considered as having passed from conjecture to certainty.

Equally striking confirmation attended the endeavour to prove the agency of infested hay in the production of the disease. Long grass from paddock B was cut from a patch of about 50 yards in extent. This grass was cut with sickles and well shaken and examined in the process. After drying it was stacked, and appeared after close observation to contain no signs of tick life. The material was used as bedding for two healthy animals confined in a small enclosure provided with a shed, which had been erected on clean or uninfected ground. This bedding was first used on 6th February, and thirteen days after its use had been commenced one of the beasts commenced to react, and in due course died from the disease. The other beast was at once withdrawn and sprayed.

In this way the theory of the possibility of transmission of the disease by the medium of hay was brought to proof under exact conditions of observation. Whether hay becomes divested of its tick life by longer keeping is a point not as yet determined, as far as the writer knows. The preliminary experiments with ticks, as given in Schedule X, prove that these insects are capable not only of concealing themselves skilfully in the axils of the leaves, etc., of grasses, etc., but also that, once established on a certain tuft or stem of grass, their tenancy is very persistent. Doubtless lengthy storage would divest hay of its dangerous properties, but in the absence of exact knowledge as to duration of tick life under such conditions it would seem inadvisable, whatever its age to use—either for feeding, bedding, or packing purposes—any hay drawn from a spot or locality under suspicion.

While the above agencies (viz., human traffic and hay) have been looked upon as such probable factors in the transmission of the disease as hardly to need scientific proof, the theory of the agency of animals, especially sheep, has been more open to question, no direct evidence—so far as the writer knows—having been brought forward in support of the suspicion. The question must, in the light of the following experiment, be considered as definitely decided.

A small flock of twenty-five sheep was turned into paddock B and herded in its lower part. At night they were folded in a small shed in paddock C. This shed was also used at night time by two beasts which had occupied this paddock for some three months. Ten days after the first entry of the sheep into this shed the disease broke out in paddock C. As no other agency could have been concerned in this appearance of the disease the conclusion is unavoidable that the infective tick attached itself during the day to the sheep grazing on contaminated ground, and that it was transferred in the sheep's fleece to the shed where the animals were folded at night, there leaving the sheep for attachment to its more congenial host, the ox. The agency of the sheep in this case would doubtless be that merely of a mechanical transporter of the tick, inasmuch as complete attachment would have divested it of its infective power. The point which seems of significance is that ticks, which generally freely attach themselves to the sheep, are also capable of remaining unattached in

the fleece and of exercising some selective preference for their bovine host should the opportunity of transference present itself.

The movement of undipped flocks through clean farms or areas, or even from one paddock to another, must in the future be the subject, under certain conditions, of increased caution.

The hide of a beast dying from East Coast fever has always been an object of suspicion as regards its infective potentialities.

In order to confirm or disprove the theory a hide was removed from a beast dying during the night or early hours of the morning of 4th November. The animal, which showed a considerable degree of tick infestment and was of course undipped, was skinned about 8 a.m. and the hide laid, hair down, upon the grass in a clean enclosure. Three healthy beasts were then picketted at different points round the spot, and at such a distance that they could approach within 6 feet of the hide itself. They remained in these positions for seven weeks without contracting the disease, and were kept under observation for a period of fourteen days after their removal. No disease developed in any of these animals.

The intention of exposing the test animals shortly after the hide had been put in its place was to provide facility for the attachment of any ticks leaving the hide unengorged, or only slightly fed, and seeking reattachment to another host. The period of seven weeks during which the animals remained close to the spot was a sufficient period to have allowed of the moulting of any larval or nymphal forms of ticks remaining attached to the hide, and of their assuming an active and hungry stage. The fact that no infection followed such close contact would seem to prove that no such potentially infectious forms escaped from the hide, otherwise infection would appear to have been inevitable.

The writer's opinion is that all engorged or sufficiently fed larvae or nymphs left the hide at, or shortly after, the death of the beast,* and several hours before the removal of the skin, and that ticks which at the time of skinning remained attached or crawling were unable to mature owing to the absence of nutriment and possibly to the commencing drying of the skin. If this theory were correct it would appear that a process of natural "disinfection", so to speak, occurs of the hide of a beast dying from the disease.

While it seems right to quote the results of the above negative experiment in reviewing the various factors which have been credited as agents in the dissemination of the disease, it seems that too much significance should not be attached to the results of the test, inasmuch as no accurate observations could be made in the case as to the exact time elapsing since death, it being conceivable that by the anticipation of a few hours a positive result might have been secured.

The experiment also (beyond adding something of a negative nature to our sum of knowledge concerning the disease and its means of spread) cannot claim any practical application to our systems of eradication or control, nor would it seem expedient to modify existing restrictions concerning the dipping, etc., of hides before removal. Such articles—apart from the question of any original inherent danger—must always be looked upon as an ideal medium for the carriage of ticks should the means for reinfestment be present, and the

* The hide was occasionally turned over, but no adhering ticks could be detected twenty-four hours after its exposure.

complete disinfection of the skin of the beast dying from East Coast fever must continue to be considered as of paramount importance.

Turning from the foregoing observations on the prevention, eradication, and means of spread of the disease East Coast fever, it may be of interest to quote certain observations undertaken in the endeavour to show the ease and rapidity with which paddocks of moderate size can be divested of their ticks, provided systematic and sustained efforts are made towards clearance under a system of short-interval dipping.

The extinction of the non-pathogenic or uninfected tick from large areas—or even its reduction within reasonable limits—has generally been looked upon as a well-nigh impossible task, or one only to be achieved by an irksome system of dipping extending over a period of some years.

The following experiment will show, however, that the end can be attained with certainty and rapidity provided the owner is prepared to take the necessary trouble. Schedule XI gives a rough ground plan of paddock A adjoining the paddocks shown on map 1. The extent of this enclosure is about ninety acres, its contour very irregular, and the vegetation at its lower part dense with much long rank grass.

This paddock which contained many ticks in its lower parts was roughly divided by pegging off (with fencing standards), the corners of squares having sides of about 200 yards in length. In certain parts the contour of the ground was such as to prevent the sub-division into rectangular figures, but the superficial area of such irregular divisions was roughly made to comprise the same extent of ground, viz., about eight acres to each plot. These plots or sub-divisions were numbered as shown in Schedule XI, and each plot was grazed for a period of three days by a small herd of cattle (about thirty-two in number).

At the expiration of the seventy-two hours grazing the herd was driven down and passed through the dip after a careful count had been made of the number of ticks present under the tail and in the brush. The beasts when dry were returned to the next plot and confined roughly within its limits during the day by two native herds, at night the cattle were at liberty to graze anywhere within the paddock.

In this manner a *systematic* grazing of the whole area of the paddock was ensured during the hours of daylight, a period which Schedule XII shows to be the most important time in consideration of some form of tick attack. After the three days grazing each plot remained unoccupied while the eleven remaining plots in their turn were being grazed—a period of about thirty-three days occurring from one occupation to the next.

In spite of their restricted grazing ground (or perhaps by reason of it) and in spite of their regular dipping every three days the herd remained in excellent condition, as the frontispiece to this report which was taken after their sixtieth dipping at seventy-two hours interval will serve to testify.

It will be seen that the numbered plots of Schedule XI enclose the dates upon which they were grazed, and the figures against these dates give the average of the number of ticks found upon the beasts and brought away from the plot to the dip. The decrease is interesting and shows in a marked manner the effect which one short period

of three days grazing will produce upon a given area and the consistent diminution in tick life brought about by each repetition of the process.

Any question as to the practical tick-killing properties of the three-day dipping fluid would be answered as directly by these results as by the restraint exercised on infected ticks in the foregoing paddock experiments.

It is of course remembered that the above results were attained during summer weather and while good grazing was available, and it is not thought that the exact details of the experiment could be applied without adjustment under all conditions of season and veld.

Like much of the foregoing work, however, the question of exact applicability to every condition has been less a matter of concern in this experiment than the establishment of standards of comparison which may serve—though applied under differing conditions—to guide those seeking to suppress the disease East Coast fever or eradicate the tick.

In the attempt to compute the actual efficiency—i.e. the extent of damage to the tick—of any dipping agent it must not be forgotten that the visible result (or the number of dead ticks found) is only a part of the actual effect produced (see Schedule V). This point was called attention to in Part II of this report where it was shown (Part II, page 8, Schedule B) that the effect of a dipping remained for several days after immersion, and that ticks which attached themselves during the persistence of this residual effect would—though undipped—succumb in large numbers if the dipping of their host had previously been carried out at short intervals in an arsenical solution of a strength properly adjusted to the interval of time between immersions.

In the endeavour to compute this residual effect in the case of the three-day dip a number of observations were made (see Schedule XIII) from which it will be seen that the effect—though still serviceable—is considerably less than where a dipping fluid of double the arsenical strength is used (as in the Laboratory dip). This diminution of the residual or sustained killing effect in the new dipping fluid seems at first a serious drawback until it is remembered that the need for such sustained effect is done away with almost entirely, no tick once attaching itself to the beast being able to escape immersion.

Where dipping is practised once every week the need for such prolonged action is more apparent, although, as stated above, instances must even here occur of ticks escaping and living to spread the disease.

Such cases, however—from the wide practical results secured—must be of rare occurrence only.

Reference to the Schedule XIII will show that the residual effect established by the use of the weakened dip is responsible for the death of 16.8 per cent. of the adult ticks attaching themselves in the short interval before the repetition of the dipping process.

A point of some interest coming to light in the above connection was the higher degree to which—under identical conditions—this sustained or residual effect became established in the case of the horse, in which animal the percentage was 22.5 per cent. or nearly 6 per cent. greater than in the case of the ox, such percentages being derived from 220 observations in the horse and 107 in the ox. The writer is at a loss to suggest an explanation for this unexpected result unless upon the assumption that the rate of elimination of the arsenic in the

layers of the skin is greater in the ox than in the horse. The existence, in any case, of a difference to the above degree would seem to point to the fact of some vital (physiological) difference in skin activity rather than a difference in capacity for mechanical absorption (under which theory the thicker skin of the ox would seem likely to prove more absorbent and more tolerant and be capable therefore of exerting a more pronounced residual effect).

The predilection of the brown tick for certain sites or regions of the body has often been noted by observers in the past, and the frequency with which ticks attach themselves to the extreme end of the tail, among the long hairs of the terminal tuft has led a number of farmers to remove this tuft with the intention of reducing the incidence of tick attack at this spot, it having been observed that if the hair at the end of the tail is removed the number of ticks found in this situation is considerably lessened.

It was desirable to observe--in view of the increasing prevalence of the custom of removing the tail tuft—whether any advantage really attended such removal. The disadvantage, from the animal's point of view, is obvious enough, especially in close warm weather when flies are troublesome, and unless the operation can be proved of utility its further adoption seems inexpedient.

Accordingly a series of tests was instituted in two small herds or lots of fifteen beasts each, both of which herds were grazed together under identical conditions. In one lot of cattle the hair was clipped from the tail, while in the other case the tails were left long and untouched. These two herds were brought to the dip every three days, and the occasion was used to count the numbers of ticks collected in this period by the two herds respectively. From the Schedule XIV it will be seen that the efficacy of the tail tuft as an agent for the collection of ticks is considerable, and that by its means 66 per cent. more ticks become actually attached to the long tailed beast than to the beast with the tuft of hair removed. This is a point of no small importance where an endeavour is being made to clear up tick-infested pastures, and it is evident that no good purpose is served by avoiding to a great degree the attachment of the insect, if by such avoidance more than a third of the ticks which should have been secured and brought to the dip are left behind to indefinitely continue the infestment of the ground.

It seems therefore that the practice of the removal of the tail tuft is one which should be discontinued in the interests both of the owner and his beast. At the same time the fact should be recognized that the hairs of the long tail serve to some extent as a defence to the tick against the action of the dipping fluid. It is therefore desirable to dress the end of the stump of the tail occasionally with a little of the compound mentioned in Schedule VII as by this means any clumps or aggregations of ticks (which it should be specially noted are often resistant to the action of the dip) will with certainty rapidly become destroyed.

One of the great objections which has been brought forward by the opponents of short-interval dipping is the alleged inability produced in working oxen, by which after dipping they are prevented from working for a long period. Such an objection has been greatly overstated, and the difficulty (which to some degree does exist with oxen unaccustomed to dipping) rapidly disappears as such animals become habituated to the process and tolerant of the presence of arsenic in their coats.

The general agreement of opinion amongst those who have regularly adopted the short-interval system of dipping in Natal is that oxen can either be worked in moderation shortly after emerging from the dip or can within a few hours perform their usual work, provided an outspan during the hottest hours of the day is afforded. The weight to be given to this objection therefore will be able to be judged at its proper worth, but the stock-owner really desirous of saving his cattle from the inroads of the disease is urged to base his action upon practical results rather than upon the fears or prejudices of those opposed to the adoption of dipping measures.

The writer has had no opportunity of determining to any satisfactory extent the efforts of the new three-day dip upon the working capacity of oxen, but there seems no reason to doubt that whatever difficulty in this respect may have existed in the past will be much reduced by the use of a fluid in which the percentage of arsenic is reduced by one-half even though its application is more frequent. This opinion is based upon the ease with which cattle and horses (entirely unaccustomed to be dipped) will tolerate immersion every three days without any loss of condition, and also upon the reduced residual or accumulated effect (dealt with above) which is found to attend the use of the weaker dip—an effect in all probability in close relation to the question of temporary inability under consideration.

Recognizing the inconvenience likely to be experienced by sheep farmers in the maintenance of two dips (one for sheep and one for larger stock), necessitating the use at times of two different dipping fluids, an endeavour was made to adopt the Laboratory dip for use as a sheep dip. It was found, however, that the usual arsenical percentage was too high to be safely employed except at somewhat lengthy intervals. The reduction of arsenical strength employed in the three-day dip appeared to overcome this difficulty and permit of its use as frequently as occasion demanded, while the soap and oil constituents of the dip promised to prevent the abstraction of the natural fats of the wool likely to follow the use of an alkaline dip (such as arsenite of soda alone uncombined). Weekly dippings in the three-day dip of a small experimental flock of clean sheep being tolerated for a lengthy period without an inconvenience or disability it was necessary to observe the more important question of the action of the dip on sheep affected with the disease scab.

This disease was therefore harboured and promoted among a large number (some 160 merino sheep) and was allowed to spread until this experimental flock was very badly affected.

Schedule XV will give the more precise details of the experiment, but it may be said here that by a repetition of the process of dipping (which did not in the least affect the health or condition of the flock) the disease was rapidly eradicated, since which time the entire flock has passed through the dipping tank, being completely immersed each time, without the loss of a single sheep, the number of such weekly dippings totalling eighteen up to the present.

It would appear therefore that the three-day dipping fluid will be found to be adapted well to the requirements of the sheep-owner who—if possessed of a full-sized dipping tank—can with a minimum of trouble arrest the first signs of an outbreak of scab in his flock by passing his sheep or goats through the same dip as that which he is using in the endeavour to fight the disease East Coast fever or clear his farm from ticks.

If stock-owners once recognize the fact that by the adoption of any system of dipping they will be able:—

(1) To check with certainty, and with little or no loss, an invasion of East Coast fever;

(2) to arrest with certainty and ease any manifestation of the disease scab in their flocks; and

(3) to look forward with confidence in the near future to the practical eradication of the disease-producing tick from their farms;

the greatest problem affecting the agricultural welfare of South Africa will be well advanced towards its solution.

Such a system has been attempted to be outlined in the three parts of this "Report on Dipping and Tick Destruction", of which the above is the concluding part.

The question of *time* or the adapting of the dipping process to the life history of the tick has been considered as the essential point of these observations. Such adaptation has necessitated the revision of the composition of the generally used dipping fluids in order to permit a much more frequent repetition of the process than that usually practised, a repetition which, while harmless to the beast, must be lethal to the tick in all its active phases.

For ordinary use as a precautionary and tick-destroying method, in the absence of specific disease, the use of the formula (given in Part I of this report under the name of the Laboratory Dip) will be found to answer the purpose for which it was arranged, viz., that of a regular five-day or weekly dip or spray, and the writer—encouraged by the results which have attended the use of this dip—recommends its continued use in circumstances where no urgency exists.

Good results will be found to attend the use of such of the proprietary dipping fluids now on the market as have been altered to meet the short-interval requirement which our increasing knowledge of the tick and its habits has rendered imperative.

Where, however, the disease East Coast fever is threatening a district or farm which is well fenced, and in all localities where the eradication of the tick pest is a matter of serious moment, the writer strongly urges—even at the expense of increased routine trouble—the adoption of the still shorter interval of three days, confident that the outcome will be greatly to the advantage both of the individual and of the community.

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It is again my duty to express an indebtedness to my Veterinary Assistant, Mr. A. W. Shilston, M.R.C.V.S., both for his valued assistance in the foregoing work and for the many suggestions with which he has advanced the inquiry.

SCHEDULE I.

Shortest Periods for Engorgement of the Larva and Nymph of the Brown Tick.

Preliminary observations were made upon the rabbit by reason of the ease with which this tick was observed to attach itself.

Four rabbits were infested with a number (some thousands) of larvae each. These ticks were placed on their host at 11.45 a.m. on

15th January, and it was found that engorged forms first commenced to loosen their attachment at 11.45 a.m. on 18th January, a period of seventy-two hours precisely.

Control observations were made on cattle, a large number of larval ticks being placed upon the ears of beasts, over which bags were then tied. Several engorged forms were found in the bags as early as sixty-eight hours (10.15 a.m. 15th March to 6 a.m. 18th March), a result which there is no reason to doubt frequently occurs in the case of infected cattle under natural conditions.

In the case of nymphs, observations similar to above were made upon rabbits, the shortest period of engorgement noticed being seventy-one and a half hours.

In the case of cattle, no engorged nymphs could be recovered until the eighty-fourth, while, in repeat experiments, the time was still further lengthened, the period apparently being dependent upon the mean temperature, as, in one case observed during the cool days of early April, no engorgement took place for over five days, although attachment was effected at once. The main deduction from the above observations is that where dipping is relied upon as a check to East Coast fever, such dipping must be made at intervals of not longer than seventy-two hours if the escape of *all* forms of infectious ticks is to be prevented.

SCHEDULE II.

Showing Details of Adjustment of "Three-day" Dip.

The above schedule shows the manner in which the various component parts of the dip were arranged, and also the manner in which the solutions of varying strengths were tolerated by the cattle immersed in them. It will be noticed that three estimations of arsenical strength were experimented with, namely, three-quarters, one-half, and five-twelfths—the strength of the "Laboratory Dip". Further dilutions were also tried, namely, one-third and one-quarter of the strength of this original dip, but it was found that these latter dilutions were not efficient in practice.

The main observations, therefore, were confined to the above strengths which correspond to 6⅜ lb. 4¼ lb., and 3½ lb. respectively of standard arsenite of soda to 400 gallons of water, etc.

A further variation was introduced by omitting, in certain cases, the paraffin and soap mixture in order to test the suitability of arsenite of soda alone when used in such weak solutions.

Further, it will be noticed from the above table that certain dippings were practised at intervals of forty-eight hours (one clear day), while in others the interval was seventy-two hours (two cle r days).

Reference to the table will show that the 6⅜ lb. (which is called the three-quarter strength, as compared with Laboratory Dip) when applied every two clear days, resulted in the casting, after the sixth immersion, of the five animals shown, and that they had to be allowed a fortnight's interval before dipping could be recommenced; further experiment with this strength, and at this interval, was therefore discontinued.

In the case of 4¼ lb. to 400 gallons (so-called one-half strength), it will be seen that estimations were made at intervals both of one

clear day and two clear days, and also that separate experiments were made at this arsenical strength by omitting soap and paraffin from the dipping fluid. In these latter cases (minus soap and paraffin), it will be seen that the half strength (4¼ to 400 gallons) necessitated the casting of the experimental animals for some period after nine or ten immersions, owing to cracking of skin, which condition was more pronounced in the animals dipped at only one-day interval. Where, however, the full formula was used, it will be noticed that it was only necessary to omit two of the routine dippings at the one-day interval, and only one dipping at the two-day interval, while the omission in this latter case was not imperative.

After a number of dippings, varying, in the case of the one-day interval, from 17 to 19, and in the case of the two-day interval dip from 11 to 12 immersions, the whole herd was passed with regularity through a dip containing 4 lb. of arsenite of soda to 400 gallons, together with an adjusted proportion of soap and paraffin (see Schedule VII), and it is this composition which is referred to in the foregoing pages as the "Three-day" Dip. Reference to frontispiece will show that between sixty and seventy dippings at this interval have been tolerated without any loss of condition.

SCHEDULE II.

Showing Details of Adjustment of "Three-day" Dip.

Strength of Dip.	No. of Beast.	October. 9	12	15	18	21	24	27	30	November. 2	5	8	11	14	17*
6¾ lb. Arsenite of Soda—with Soap and Paraffin—to 400 gallons (¾-strength).	85	X	X	X	X	X	X	O	O	O	O	X	X	X	X
	86	X	X	X	X	X	X	O	O	O	O	X	X	X	X
	87	X	X	X	X	X	X	O	O	O	O	X	X	X	X
	88	X	X	X	X	X	X	O	O	O	O	X	X	X	X
	89	X	X	X	X	X	X	O	O	O	O	X	X	X	X
4½ lb. Arsenite of Soda—with Soap and Paraffin—to 400 gallons (½-strength).	65	—	X	X	X	X	X	O	X	X	X	X	X	X	X
	66	—	X	X	X	X	X	O	X	X	X	X	X	X	X
	67	—	X	X	X	X	X	O	X	X	X	X	X	X	X
	68	—	X	X	X	X	X	O	X	X	X	X	X	X	X
	69	—	X	X	X	X	X	O	X	X	X	X	X	X	X
	70	—	X	X	X	X	X	O	X	X	X	X	X	X	X
	71	—	X	X	X	X	X	O	X	X	X	X	X	X	X
	72	—	X	X	X	X	X	O	X	X	X	X	X	X	X
	73	—	X	X	X	X	X	O	X	X	X	X	X	X	X
	74	—	X	X	X	X	X	O	X	X	X	X	X	X	X
4½ lb. Arsenite of Soda to 400 gallons (no Soap or Paraffin)	75	—	X	X	X	X	X	O	O	O	X	X	X	X	X
	76	—	X	X	X	X	X	O	O	O	X	X	X	X	X
	77	—	X	X	X	X	X	O	O	O	X	X	X	X	X
	78	—	X	X	X	X	X	O	O	O	X	X	X	X	X
	79	—	X	X	X	X	X	O	O	O	X	X	X	X	X
	80	—	X	X	X	X	X	O	O	O	X	X	X	X	X
	81	—	X	X	X	X	X	O	O	O	X	X	X	X	X
	82	—	X	X	X	X	X	O	O	O	X	X	X	X	X
	83	—	X	X	X	X	X	O	O	O	X	X	X	X	X
	84	—	X	X	X	X	X	O	O	O	X	X	X	X	X

The X indicates a dipping; the O the omission of the same.

* From this date all the cattle were dipped regularly in three-day" dip at intervals of 72 hours.

SCHEDULE II (*continued*).

Strength of Dip.	No. of Beast.	October. 8	10	12	14	16	18	20	22	24	26	28	30	November. 1	3	5	7	9	11	13	15	17*
4½ lb Arsenite of Soda—with Soap and Paraffin—to 400 gallons (½-strength)	90	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	91	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	92	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	93	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	94	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
4½ lb. Arsenite of Soda to 400 gallons (no Soap or Paraffin)	95	X	X	X	X	X	X	X	X	X	O	O	O	O	X	X	X	X	X	X	X	X
	96	X	X	X	X	X	X	X	X	X	O	O	O	O	X	X	X	X	X	X	X	X
	97	X	X	X	X	X	X	X	X	X	O	O	O	O	X	X	X	X	X	X	X	X
	98	X	X	X	X	X	X	X	X	X	O	O	O	O	X	X	X	X	X	X	X	X
	99	X	X	X	X	X	X	X	X	X	O	O	O	O	X	X	X	X	X	X	X	X
	36	X	X	X	X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	X	X	X
	42	X	X	X	X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	X	X	X
	45	X	X	X	X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	X	X	X
	63	X	X	X	X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	X	X	X
	64	X	X	X	X	X	X	X	X	X	O	O	O	O	O	O	X	X	X	X	X	X
3¾ lb. Arsenite of Soda—with Soap and Paraffin—to 400 gallons ($\frac{5}{12}$-strength)	100	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	101	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	102	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	103	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	104	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
3¾ lb. Arsenite of Soda to 400 gallons (no Soap or Paraffin)	105	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	106	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	107	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	108	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X
	109	X	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	X	X	X

The X indicates a dipping; the O the omission of the same.

* From this date all the cattle were dipped regularly in "three-day" dip at intervals of 72 hours.

SCHEDULE III.

Lethal Effects of "Three-day" and "Laboratory" Dips on Distended Female Brown Ticks.

It will be observed that these observations were based on the effect exerted by three different strengths of dip, namely, one-quarter strength (½ lb arsenite of soda to 100 gallons), one-half strength (1 to 100 gallons), and full strength (2⅛ lb. to 100 gallons), and that the results show that 1 lb. to 100 gallons is sufficient to prevent the eggs laid from hatching out, while, in some cases, the females died before commencing the process of laying. In the case of the weaker dip, it will be noticed that development was not certainly arrested, but that the females laid eggs, which, in one or two cases, succeeded in hatching out. In the case of the full strength (Laboratory Dip), out of a test of fourteen ticks, all were killed by the dip, although two survived long enough to commence the laying of a few eggs, which were unable to hatch.

In some of the above cases, where only one-quarter strength was used, it will be noticed that eggs were laid, and development occurred within the same (in some cases to a considerable extent) before the inhibitive influence of the dipping on the parent tick appeared to be exerted. In the majority of cases, however, in which eggs were laid, no commencing development of the egg could be traced.

The effect of the "Three-day" dip (or 1 lb. to 100 gallons), therefore, upon tick life may be judged from the above results.

SCHEDULE IV.

The Effect of "Three-day" Dip at intervals of seventy-two hours upon Adult Tick Life generally.

Ten cattle were taken for a preliminary observation. They were harbouring the numbers of ticks shown below, and were dipped upon 12th January and 15th January, 1911, being kept under conditions which precluded the possibility of further infestment by ticks during this interval.

	12th January.		15th January.		18th January.	
	Number of Ticks.		Number of Ticks.		Number of Ticks.	
	Below Tail.	In Brush.	Below Tail.	In Brush.	Below Tail.	In Brush.
No. 42	2 Alive	18 Alive	0 Alive	6 Alive 7 Dead	0 Alive	0 Alive. 2 Dead.
No. 67	3 Alive	24 Alive	0 Alive	9 Alive 10 Dead	0 Alive	6 Alive.* 2 Dead.
No. 68	4 Alive	0 Alive	0 Alive	0 Alive 0 Dead	0 Alive	0 Alive.
No. 75	11 Alive	0 Alive	1 Alive	0 Alive 0 Dead	0 Alive 1 Dead	0 Alive.
No. 80	1 Alive	8 Alive	0 Alive	0 Alive 0 Dead	0 Alive	0 Alive.
No. 81	3 Alive	1 Alive	0 Alive	0 Alive 0 Dead	0 Alive	0 Alive.
No. 90	0 Alive	8 Alive	0 Alive.	2 Alive 1 Dead	0 Alive	0 Alive. 1 Dead.
No. 91	4 Alive	39 Alive	0 Alive 2 Dead	17 Alive 18 Dead	0 Alive	4 Alive.* 10 Dead.
No. 94	3 Alive	10 Alive	1 Alive 1 Dead	4 Alive 4 Dead	0 Alive 1 Dead	0 Alive. 4 Dead.
No. 95	2 Alive	11 Alive	0 Alive 1 Dead	6 Alive 4 Dead	0 Alive	0 Alive. 1 Dead.
Totals	33 Alive At commencement.	119 Alive	2 Alive 4 Dead	44 Alive 44 Dead	0 Alive 2 Dead	10 Alive.* 20 Dead.

* See notes.

Total ticks on cattle on 12th January ...	152 alive.
Total ticks on cattle on 15th January ...	46 alive, attached. 48 dead, attached. 58 dead, dropped off. 152
Effect of one immersion in "Three-day" Dip, after 72 hours	30·2 per cent. ticks survive. 31·5 per cent. ticks dead attached. 38·3 per cent. ticks dead dropped off.
Total ticks on cattle on 18th January ...	10 alive. 22 dead, attached. 14 dead, dropped off.
Effect of two immersions in "Three-day" Dip, after 144 hours	6·5 per cent. ticks survive (see observation below concerning survivors). 46 per cent. ticks found dead. 47·5 per cent. ticks dead dropped off.

It will be seen that the above cattle harboured 152 live ticks at the time of their first dipping. At the end of seventy-two hours 31 per cent. of these ticks were found dead and attached to their hosts, 30 per cent. were alive, while 38 per cent. had died and become detached. A further dipping was then given, with the result at the end of a further seventy-two hours that only ten ticks remained alive. These ten survivors present upon animals Nos. 67 and 91 existed in aggregations or clumps of ticks, which past observation has shown to be much less rapidly affected by the action of the dip than separate ticks. Such collections of ticks are, however, easily detected by reason of their bulk when they exist, and the touching of these masses with a small quantity of ear-dressing mixture will destroy within a few hours all signs of life, though even this procedure is unnecessary by reason of their ultimate death.

A fuller series of observations was then undertaken, comprising 207 computations, details of which, by reason of their length, are not quoted. The result of such extended experiment was found to compare closely with the above figures, the exact percentages being as follows for the end of the seventy-two hours period:—

Second observation:—

Effect of one immersion in "Three-day" Dip, after 72 hours ... ... 30·7 per cent. alive.
27·3 per cent. dead, attached.
42 per cent. dead, dropped off.

In each test it will be observed about 30 per cent. of the ticks are alive at the expiration of seventy-two hours, but many are sick and continue to fall rapidly, irrespectively of a secon immersion.

The significance to be attached to the temporary survival of a few forms of adult tick life is dealt with in the text of the report.

The increased lethal effect exerted by the "Three-day" dip when used at forty-eight hours' interval is noticed in Schedule V.

SCHEDULE V.

The lethal effect of dips (one-half and five-twelfths strengths) at intervals of forty-eight hours, showing the increase of efficiency resulting from the addition of soap and paraffin.

All the cattle mentioned below were dipped on 12th November.

STRENGTH OF DIP.	No. of Beast.	12th Nov. No. of Ticks.	13th Nov. No. of Ticks.		14th Nov. No. of Ticks.		Percentage Killed.
		Alive.	Alive.	Dead.	Alive.	Dead.	
4 lb. Arsenite of Soda to 400 gallons (*no Soap or Paraffin*)	95	38	25	13	7	18	
	96	12	4	8	0	3	
	97	35	1	26	0	1	
	98	24	3	21	0	1	
	99	46	18	19	0	12	
		155	51	87	7	35	95·5 % killed.
4 lb. Arsenite of Soda to 400 gallons (*with Soap and Paraffin*)	90	22	13	9	0	5	
	91	29	18	11	1	7	
	92	17	7	10	0	4	
	93	15	1	14	0	0	
	94	25	14	11	2	7	
		108	53	55	3	23	97·3 % killed.
3½ lb. Arsenite of Soda to 400 gallons (*no Soap or Paraffin*)	105	13	3	7	1	3	
	106	38	11	26	2	7	
	108	13	3	6	2	1	
	109	14	12	11	1	1	
		78	19	50	6	12	92·3 % killed.
3½ lb. Arsenite of Soda to 400 gallons (*with Soap and Paraffin*)	100	16	8	6	0	3	
	101	26	7	14	2	6	
	102	23	8	15	0	6	
	103	20	1	8	0	1	
	104	15	8	5	0	5	
		100	32	48	2	21	98 % killed.

A notable feature of the above table is the great increase of destructive effect produced upon the tick where the dippings are given at intervals of one clear day (forty-eight hours). These frequent immersions were continued till the commencement of the above experiment at which time sixteen dippings had been given (with a short intermission as shown in Schedule II).

Before receiving their final dipping, the animals in question were intentionally infested with numbers of ticks, and on 12th November they were dipped in fluids of two different strengths and composition as shown.

Even where the arsenical content was as low as 14 oz. to the 100 gallons (3½ lb. to 400 gallons), and where no soap or paraffin was employed the destructive effect at the end of forty-eight hours equalled

Dipping and Tick-Destroying Agents.

GROUP OF FREQUENTLY DIPPED CATTLE.

These experimental cattle (about 30 in number) have been regularly dipped for more than six months every 72 hours. The above photograph serves to show that, in spite of 68 such dippings, the condition of the herd has been maintained.

Champion Friesland Cow, Bloemfontein, 1911.
Owned by Messrs. Schweizer & Kannemeyer, of Burghersdorp, C.P.
This animal unfortunately died on 1st June.

Merino Ram, "Sylvan King", by "Sylvan".
Champion at Grahamstown, 1910 and 1911, and Champion at Port Elizabeth, 1911.
The property of Mr. T. T. Hoole, Atherstone, C.P.

92.3 per cent., which effect was increased by almost 6 per cent. (98 per cent.) by the addition of these agents.

The above results are interesting as showing (*a*) the possibility of the repetition of the dipping process every forty-eight hours in the "Three-day" Dip, and (*b*) the greatly increased lethal effect produced by this system of frequent dipping. No alteration however is made in the practical application of these observations inasmuch as our end is attained by the adoption of a system of dipping arranged to meet with exactness the life phases of the tick; and beyond this point it does not seem necessary to go either in reduction of interval or severity of effect.

SCHEDULE VI.

Observation of the schedule below shows that a distinct repelling or revulsive effect is exercised by the dipping fluid upon the immature forms of tick life, and that—while the hungry adult tick attaches itself freely to even a freshly-dipped beast—a period of immunity is possessed by the animal from the attack of the larva and nymph for a considerable time after immersion.

How long such immunity to attack persists has not been accurately determined, but it appears to depend to a large extent upon the presence in the coat of the animal of the paraffin component of the dip, the young ticks commencing to attach themselves as this agent becomes dissipated or evaporated from the hair. This period of immunity thus gained—even though it may persist for only a few hours—is of the utmost service in delaying the attachment—and consequent maturing—of the young tick, the destruction of which it is thus possible to accomplish with certainty.

Schedule I shows the possibility of the maturing and escape of the larva in as short a time as sixty-eight hours. Escape of infectious forms of tick life under such circumstances would be possible during the period (four hours) left unprotected between the 68th and 72nd (or dipping) hour unless a restraining effect was exercised by the dip as shown herewith, by which a temporary immunity to attack is ensured.

OBSERVATIONS ON LARVAE.

Calf (41) *sprayed with "Three-day" dipping fluid.*

Control calf (147) *remained unsprayed.*

21st January.—A number of active larvae of the brown tick were placed upon various parts of the body of the above calves (chiefly upon the ears and belly).

24th January (seventy-two hours).—No larval ticks could be discovered upon the control calf. A number of engorging forms present on calf (41).

Repeat Experiment.

Calf (42) *dipped in tank.*

Control calf (148) *remained undipped.*

4th February.—A large number of active larvae were placed upon these two calves at the same time and in approximately equal numbers.

7th February (seventy-two hours).—No single live larva discoverable in the coat of calf (42) though a number of dead larvae were present.

On control calf (148) thirty-five to forty larvae were found engorged partially or completely.

OBSERVATIONS ON NYMPHS.

Calf (36) *was dipped in tank.*

Control calf (149) *remained undipped.*

25th February.—On this date both these calves were turned into the "nymph enclosure" (see foot note).

After remaining in this enclosure for six or eight hours they were removed.

On examination on 28th February (seventy-two hours after exposure) showed a large number of nymphs beginning to fill upon calf (149), while upon calf (36) only one could be discovered attached to the ear.

OBSERVATIONS ON ADULT FORMS.

Four beasts (two recently dipped and two undipped) were turned into a tick-infested paddock. After twelve hours' grazing they were examined and the numbers of ticks present upon the recently-dipped cattle exceeded those upon the undipped—a somewhat unexpected result. The numbers of ticks upon the previously-dipped cattle however rapidly decreased owing to the exertion of the poisonous "residual" effect.

The general conclusion from the above experiments therefore is, that while recent dipping exerts no restraint upon the actual attack of the adult brown tick, it retards to a marked extent the invasion of the young or immature forms, a conclusion which is confirmed in the experimental results secured by practical tests.

Note.—"Nymphal Enclosure."

This enclosure consisted of a wide circle about 40 yards in diameter, the walls of which circle were constructed of lengths of roofing-iron joined end to end. In this enclosure innumerable tick eggs were placed under suitable covers. As the larvae hatched out and became hungry, rabbits were placed in the enclosure. The larvae were found to attach rapidly and in great numbers, and in this way mature larva were dropped within the enclosure and in due time moulted, stocking the enclosure with thousands of nymphs. A further enclosure was constructed for the production—and maintenance under natural conditions—of large numbers of larvae for the purposes of the experimental work.

SCHEDULE VII.

Details for Preparation of "Three-day" Dipping Fluid.

To mix 400 *gallons*:—

4 lb. Arsenite of soda (80 per cent. arsenic).
3 lb. Soft soap.
1 gallon Paraffin.

The above ingredients may be mixed in the same manner as

directed for the preparation of the Laboratory Dip, which is briefly as follows:—

Dissolve the soap and arsenite separately in a sufficient quantity of hot water; add the soap solution to the paraffin and beat into an emulsion; then add water to make up to 400 gallons, stirring vigorously the while.

If, however, it is found inconvenient to use heat in the preparation of the dip as above, the dipping fluid may be prepared as follows:—

Take the 3 lb. of soap, place in a bucket, and fill up with water about 3 gallons); the soap should then be broken by the hand into small pieces. In this way, and by continuous stirring, the 3 lb. of soap can be dissolved in about fifteen minutes. Then add the paraffin as above and beat into an emulsion. Take, in a similar manner, the 4 lb. of arsenite, which will be found to become dissolved in about the same time with constant stirring.

This solution, together with the emulsion, should then be placed in the mixing tank and water added, with constant stirring, up to 400 gallons. This quantity may then be allowed to run into the dipping tank.

If it is desired to mix at one time sufficient materials for the whole contents of a dipping tank of, say, 3200 gallons capacity, the following method may be adopted:—

Place the total quantity of soft soap—24 lb.—into the 400-gallon mixing tank and add about 200 gallons of cold water. This mixture should remain—with occasional stirrings—until next day, when the soap will be found to have completely dissolved.

The paraffin (8 gallons) may then be added and the whole beaten into an emulsion.

Although it will probably be found to be most convenient to dissolve the arsenite of soda in a few gallons of hot water, this may be carried out in a short time with cold water in the following manner:—

Place two or three pounds in a bucketful of water and stir vigorously for five or ten minutes; allow any undissolved particles to settle, and pour off the liquid into the tank containing the emulsion; then add more arsenite to that remaining in the bucket and fill up with water again, repeating this till all the arsenite has become dissolved.

After thoroughly mixing the emulsion and arsenite solution, the whole may be run into the dipping tank and water added until this is filled to its proper quantity.

In order to ascertain the quantity of dipping fluid removed from the tank by animals at a single dipping, several observations were made with horses, cattle, and sheep.

The following were the average amounts thus carried away after ample time had been allowed for drainage:—

Horses removed on an average ¾ to 1 gallon of dip per head.
Cattle removed on an average ½ to ¾ gallon of dip per head.
Sheep (shorn) removed on an average 3-10ths of a gallon of dip per head.
Sheep (unshorn) removed on an average 1 gallon of dip per head.

SCHEDULE VIII.

Details for Preparation of "Three-day" Ear Dressing.

Paraffin oil: 1 quart.
Paraffin wax candles, No. 6: 6 to 8.

One quart of paraffin should be cautiously warmed in an open vessel and the candles, broken in small pieces, dropped into the oil, when they will rapidly dissolve.

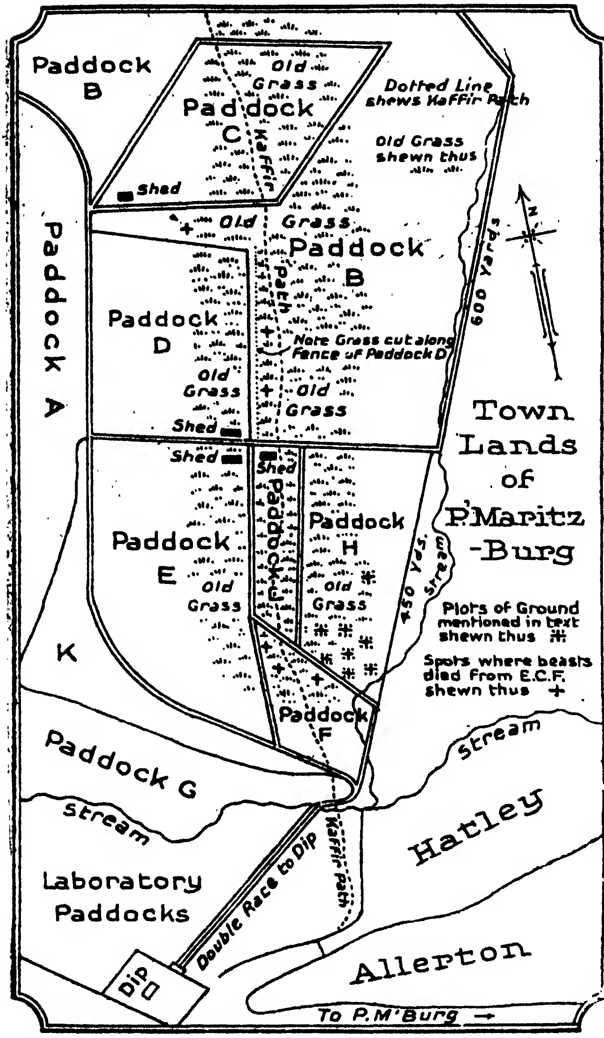
In hot weather it will be found that eight candles to the quart are necessary to produce a mixture of the required consistency, while during cold weather five or six candles will be found sufficient.

The above quantity will suffice for dressing the ears of from 120 to 150 animals, dependent upon temperature, manner of use, etc.

The mixture is best applied with a small swab tied to the end of a stick, and it will be found that no irritation attends even its repeated application to any external part.

It is not necessary to state that when preparing the above mixture over an open fire care should be taken by reason of its great inflammability.

SCHEDULE IX.



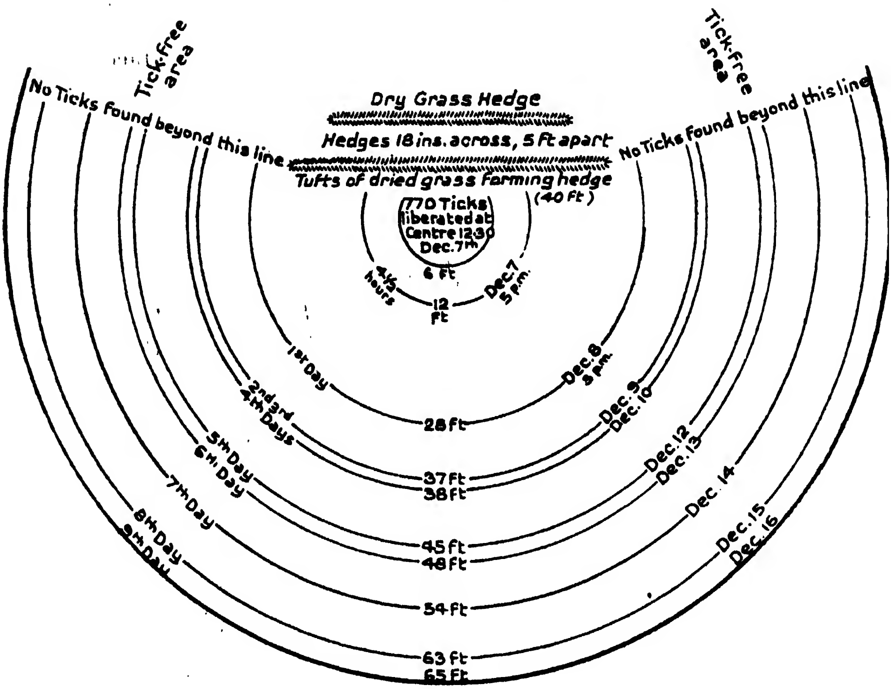
The accompanying map gives a general ground plan of the arrangement of the paddocks alluded to in the text of the report. The shaded portions in the centre of the map are intended to denote areas of long (last year's) grass. In the laying out of the paddocks the inclusion of a portion of old grass was designed in order that experimental work contemplated should be conducted under conditions of the veldt, such as obtain at different seasons.

Paddocks in which the disease was likely to become established were as a precautionary measure doubly fenced, where such paddocks abutted upon the town lands, with a safe interval or space between the fences. The watering of the cattle in certain of the paddocks was provided for by the placing of half-tubs just within the fence. These were filled by buckets from the outside, thereby avoiding any unnecessary entry of the paddocks themselves.

SCHEDULE X.

Tick Migration Experiment.

Second Observation.



The above diagram is intended to show the rate and distance at which adult hungry ticks are able to travel.

The experiment was carried out on a piece of short, closely-trimmed grass upon which no ticks existed. The outer circle on the above diagram denotes the wall (composed of sheets of roofing iron joined end to end) of which the enclosure was constructed. This enclosure, originally only some fifty feet in diameter, was enlarged day by day as found necessary in order to keep pace with the extension of the ticks. Precaution was taken against risk of escape of ticks in crawling up this wall by tarring the top edge of the iron.

On 7th December, about mid-day, 770 active adult ticks were liberated at the centre of the 6-ft. circle. They appeared to disperse rapidly in all directions. After some hours the ground was closely observed, and the progress of the most advanced ticks marked by means of small sticks. Twenty-four hours later the ground was again closely searched, and the spots at which advancing ticks were discovered were again pegged out. In this way the progress made and the distance covered were recorded daily. As the longer distances were reached the search became more difficult, owing to the increased area of the circle, and the thinning out of the ticks. The ultimate point of sixty-five feet was not gained until nine days after liberation, only two of the more adventurous insects reaching this point. It is possible there may have been others which escaped detection, but this is not probable,

as the daily search by a number of natives was long and close, in addition to which by far the greater number of the 770 ticks liberated were subsequently collected, so that no room for large margin of error exists.

Six feet behind the central point of the enclosure a line of turfs (each about eighteen inches square, and cut from spots where old tall grass existed) was dug into the ground level with the surface of the surrounding grass. Packed closely, so as to secure normal density, these turfs form a miniature hedge, or belt, of old grass forty feet in length, while behind the hedge a second belt was placed at a distance of five feet, the grass between the rows being left undisturbed. Of the 770 ticks liberated, 453, or 59 per cent., were collected from the first hedge three weeks later. Only nineteen had penetrated the grass, traversed the interval, and gained the further hedge, while beyond this second belt of grass no ticks could be found, though careful daily search was made.

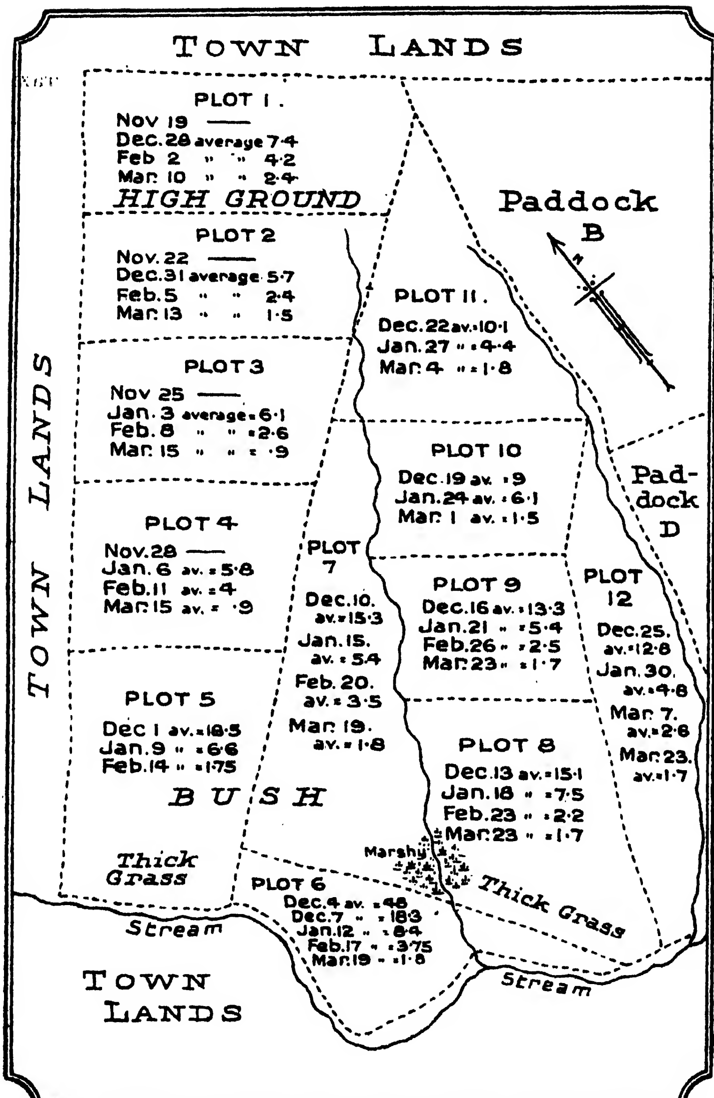
Within the centre or 6-ft. circle, where search was made three weeks later, 111 ticks were collected, which had not moved more than six feet from their point of liberation, forming an unprogressive minority of 14.4 per cent. of the total number, while 26.7 per cent. had travelled further afield.

Preliminary trials on a smaller scale had been made during the previous month, and as the results of the two experiments were in accord, observations were discontinued at the end of four weeks.

In reviewing the above findings, it may be objected that the conditions as regards the tick were artificial, and not such as obtain naturally.

The establishment, however, of some standard as to the rate and distance of tick travel may possibly be of great use in certain circumstances when attempting to estimate the probabilities and risks of infection of certain paddocks, fence lines, etc., while an accurate estimation of the risk of spread from any spot known to have been liable to infestment by mechanically transported ticks may prove of equal value. The utility of the belt of old grass as a defensive line needs, for the practical farmer, no comment.

SCHEDULE XI.



The above is a rough ground plan of paddock A showing its subdivisions. The top part of the map marked "high ground" is some 750 feet above the level of the spruit shown below. This fact will account for the difference between the numbers of ticks found, say, in plots 1 and 6. The sloping sides of the two streams flowing south were covered with bush and scrub, while the low ground at the level near the main stream was in places marshy and covered with rank grass and reeds, which harboured large numbers of ticks.

Paddock A had been grazed over by cattle (which were regularly dipped) for some time prior to its sub-division for purposes of the above experiment, otherwise the number of ticks collected would have been considerably greater. An excessive number of ticks on a given area would not, however, appear to increase the trouble or time of clearing the same, provided a suitable proportion is maintained between the size of the ground and the numbers of beasts grazing the same.

SCHEDULE XII.

Relative Tick Activity during Day and Night.

18th February.—Two rabbits were placed in a paddock containing a large number of nymphs and larvae at 7.30 p.m., remaining until 11.30 p.m. (four hours). At that time they were examined with the result that only a single larval tick was found attached.

Control.

19th February.—Two rabbits were placed in the same enclosure from 8 a.m. to noon (four hours). On examination they were found to be infected with large numbers of nymphs and larvae.

The above experiment was repeated on 24th March, when the two rabbits, exposed from 7 p.m. to 11 p.m., were found to have picked up twelve nymphs in all—an average of six.

The two *controls*, liberated from 2 p.m. to 6 p.m., were found to have fifty-six nymphs attached—an average of twenty-eight—or over three and a half times the number picked up during the same length of time at night.

To control the above observations on rabbits, a calf was turned into the same paddock on 6th March from 7 p.m. to 11 p.m. On examination after the four hours' exposure, a single tick could be found attached.

Another calf, placed in the paddock from 11 a.m. to 3 p.m., was found to have picked up eighteen adult ticks and nine nymphs.

The above instances show the difference which exists in tick-activity between the hours of darkness and light. This difference seems difficult to account for inasmuch as no eyes exist in the tick, which cannot in consequence be dependent upon the sense of sight for selection or prehension of its host. Night and day, therefore—apart from the question of temperature—would presumably be indifferent to the tick when seeking attachment. Such, however, cannot be the case as the foregoing instances show.

The difference between night and day may possibly be a matter of moment when determining, in any given case, the probability of infection having occurred or the general question of movement of stock.

Complete immunity cannot be looked for during the hours of darkness, but the risks of infection are obviously much lessened.

SCHEDULE XIII.

Residual Effect of "Three-day" Dip in Horses and Cattle.

In order to determine what lethal effect immersion in the Three-day dip fluid exercised on adult ticks becoming attached shortly after the host had been dipped, a number of cattle were cleaned from ticks and then dipped. After three days the number of ticks dead and alive on these beasts were counted; since none of the ticks passed through the dipping tank the dead ticks found must have perished as the result of the saturation of the skin with arsenic at previous dipping or dippings, and to this reserve lethal power possessed by recently-dipped cattle the term residual effect has been applied. The average percentage of ticks thus killed in one hundred and seven (107) computations was found to be 16.8 per cent. in the case of cattle dipped in the "Three-day" dipping fluid.

In horses, two hundred and twenty computations were made in the same way as in the case of cattle, with the result that the average residual effect in this animal was found to be 22.5 per cent., while in certain cases this figure was considerably exceeded, as the following observation will show.

On 19th December four frequently dipped horses were cleaned of their ticks and dipped in "Three-day" dip. Four control horses were also cleaned but left undipped. These eight animals were then turned into a paddock moderately infested with ticks. After three days' grazing the four dipped horses were found to have attached to them twelve live ticks and seven dead ones, while the undipped horses had picked up thirty-two ticks, all of which were alive. Thus, out of nineteen ticks picked up by the dipped horses, seven, or 36.8 per cent., were killed as the result of the residual effect of the dipping given before their attachment.

It would seem also that a slight repellant effect was exercised in this case by the dip, inasmuch as the dipped horses picked up only about half the number of ticks found attached to the undipped animals.

It is probable, however—judging from the observations—a larger number of ticks than those actually found would have attached themselves to the dipped horses, and, becoming poisoned, would have loosed their hold before the estimation was made. In such a case the "residual effect" would be shown by even a higher figure than 36.8 per cent. as in the last test.

The 22.5 per cent. based on the 220 observations quoted above is therefore a low figure at which to estimate this "residual effect" in the horse.

It is not necessary to recall the fact—brought out in Part II of this report published previously—that this increased destructive effect can only be looked for where frequent or short-interval dipping is adopted.

SCHEDULE XIV.

The Agency of the Tail Tuft in the Collection of Ticks.

First Observation, 1st December, 1910.

No. of Beast.	Long Tails.		No. of Beast.	Short Tails.	
	In Brush.	At Root of Tail.		In Brush.	At Root of Tail.
42	0 Ticks	13 Ticks	68	0 Ticks	2 Ticks
49	4 ,,	20 ,,	77	1 ,,	19 ,,
65	5 ,,	19 ,,	81	0 ,,	7 ,,
66	17 ,,	21 ,,	83	0 ,,	11 ,,
67	24 ,,	7 ,,	85	0 ,,	14 ,,
75	4 ,,	7 ,,	86	0 ,,	16 ,,
76	9 ,,	•17 ,,	87	0 ,,	18 ,,
78	8 ,,	9 ,,	88	0 ,,	21 ,,
79	4 ,,	11 ,,	89	1 ,,	14 ,,
80	15 ,,	18 ,,	90	0 ,,	20 ,,
82	4 ,,	11 ,,	92	2 ,,	14 ,,
84	1 ,,	19 ,,	93	0 ,,	12 ,,
91	3 ,,	34 ,,	94	7 ,,	14 ,,
95	19 ,,	8 ,,	96	0 ,,	9 ,,
100	6 ,,	9 ,,			
TOTALS...	123 Ticks	223 Ticks	TOTALS..	11 Ticks	191 Ticks

	Long Tails.	Short Tails.
Percentage in brush.........................	35·5 %	5·4 %
Percentage under tail.........................	64·5 %	94·6 %
Total number of ticks collected.................	346	202
Average per beast collected....................	23	14·4

The long tails collect 60 per cent. more ticks than the short tails.

Second Observation, 4th December, 1910.

No. of Beast.	Long Tails.		No. of Beast.	Short Tails.	
	In Brush.	At Root of Tail.		In Brush.	At Root of Tail.
42	4 Ticks	17 Ticks	68	0 Ticks	36 Ticks
49	8 ,,	59 ,,	77	3 ,,	53 ,,
65	12 ,,	21 ,,	81	0 ,,	11 ,,
66	10 ,,	41 ,,	83	1 ,,	51 ,,
67	47 ,,	26 ,,	85	0 ,,	22 ,,
75	10 ,,	26 ,,	86	2 ,,	38 ,,
76	26 ,,	35 ,,	87	3 ,,	37 ,,
78	15 ,,	45 ,,	88	1 ,,	34 ,,
79	14 ,,	49 ,,	89	2 ,,	35 ,,
80	70 ,,	45 ,,	90	9 ,,	12 ,,
82	0 ,,	36 ,,	92	0 ,,	32 ,,
84	11 ,,	56 ,,	93	6 ,,	39 ,,
91	53 ,,	35 ,,	94	0 ,,	35 ,,
95	68 ,,	15 ,,	96	3 ,,	24 ,,
100	15 ,,	76 ,,			
TOTALS...	363 Ticks	582 Ticks	TOTALS..	30 Ticks	479 Ticks

	Long Tails.	Short Tails.
Percentage in brush.........................	38·4 %	5·9 %
Percentage under tail.........................	61·6 %	94·1 %
Total number of ticks collected.................	945	509
Average per beast............................	63	36·3

The long tails collect 73·5 per cent. more than the short tails.

The above figures show the value of the tuft of the tail as an instrument for the collection of ticks. In the first observation the animals with a tail tuft (or long tail) were the means of collecting 60 per cent. more ticks than the beasts with cropped tails, while in the second observation the tuft was responsible for an excess of 73.5 per cent. over the stump tails. These figures are striking testimony to the agency of the long tail in the collection and destruction of as many ticks as possible. The comfortable delusion of clipping the tail and finding the number of the ticks apparently decrease in consequence must be in future abandoned.

One disadvantage of the tuft should be noticed, and that is the tendency for ticks to collect in clumps at certain spots among the long hair, which latter furnishes a considerable protection from the process acting doubtless on the principle of the thatch. This difficulty, however, is easily overcome by the occasional use of a little of the dressing mixture described in Schedule VIII, which will retain its deterrent effect for some time.

SCHEDULE XV.

The Suitability of "Three-day" Dip in the Treatment of Scab in Sheep.

A flock of 160 sheep (merinos), carrying heavy fleeces, ere allowed to become scabby, and the disease was permitted to run its course unchecked until it assumed an advanced and aggravated form. Half the sheep were then shorn and half retained their long wool.

On 5th December the whole flock was passed through the dip, the sheep swimming straight through and climbing out at the far end to drain. They were then turned out. Unfortunately, through an oversight, the flock was folded during the ensuing night in the old infected kraal, and there is no doubt re-infection became established to some extent in this way.

On 12th December half the flock (consisting of forty-five shorn and thirty-five unshorn) were again passed through the tank in order to observe the effect of the repetition of the dipping at so short a period as seven days. No ill effects were observed.

On 19th December the whole flock was again dipped, as, although the disease seemed checked, a few sheep continued to scratch and nibble.

On 28th December the whole flock was again dipped. Very little evidence of scratching or biting could be detected even after close watching, while scrapings from six of the apparently worst cases failed to show any evidence of live scab insects.

On 4th January the dipping was repeated, no signs of scratching or biting being observed and all scrapings being negative.

Since this time the flock has been passed through the dip every week for some sixteen to eighteen weeks in all. No accident has occurred nor has any sign of return of the disease been detected, while the flock has remained in excellent condition.

These results, which must be considered as satisfactory, proving both the possibility of the frequent immersion of sheep without danger and the ease with which an intractable disease such as scab

can be controlled without other than routine treatment. No hand-dressing or special treatment was resorted to, and the disease in the long-fleeced sheep became eradicated as rapidly as in the recently-shorn animals.

There is little doubt the eradication of the disease would have been even more rapidly effected had not the flock, after their first immersion, been folded for the night on grossly infected ground.

SCHEDULE XVI.

Effect of Weekly Dipping Process with Laboratory Dip upon Secretion of Milk.

The following figures, furnished by the courtesy of the manager of a large dairy establishment, are based upon the milk yield of about 125 cows over a period of six months.

Analysis of the figures will show that the average yield of milk upon the days of dipping was 1375 lb. (based upon the morning milking prior to—and the evening ditto after—dipping).

The average figure for the other six days—upon which no dipping took place—is 1354 lb. or slightly less than the average for the actual dipping day.

These figures—based as they are upon adequate numbers over an extended period—answer the objections which are still frequently urged against dipping by reason of its effect upon the yield of milk.

SCHEDULE XVI—(continued).

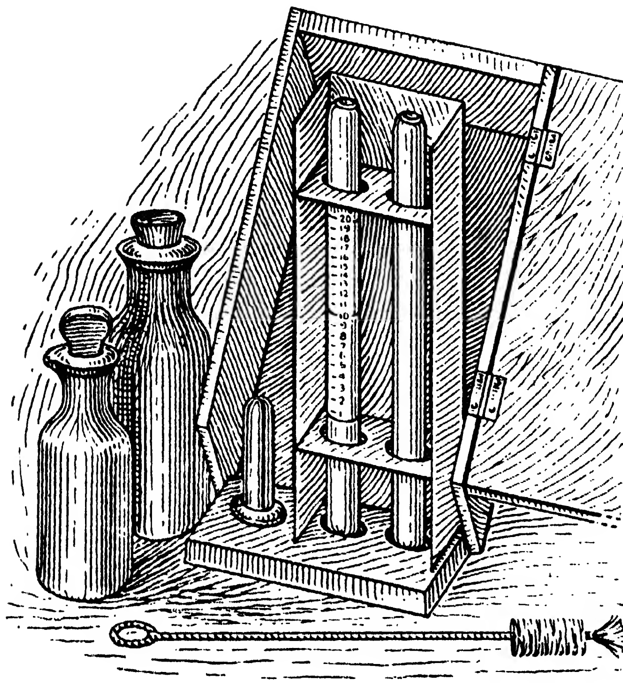
Effect of Weekly Dipping Process with Laboratory Dip upon Secretion of Milk.

DAILY MILKING RECORD FOR A PERIOD OF SIX MONTHS.

Date. June.	Quantity of milk in lb.	Remarks.	Date. July.	Quantity of milk in lb.	Remarks.	Date. Aug.	Quantity of milk in lb.	Remarks.	Date. Sept.	Quantity of milk in lb.	Remarks.	Date. Oct.	Quantity of milk in lb.	Remarks.	Date. Nov.	Quantity of milk in lb.	Remarks.
1	1146		1	1049		1	1181		1	1386		1	1704	Dipped	1	1374	
2	1148	Av. 1158	2	1067	Dipped	2	1306	Av. 1245	2	1365	Av. 1381	2	1678		2	1564	
3	1182		3	999		3	1370		3	1334	Dipped	3	1649	Av. 1636	3	1565	Av. 1581
4	1199	Dipped	4	1071	Av. 1027	4	1420	Av. 1422	4	1225		4	1583		4	1616	
5	1134		5	1013		5	1478		5	1346	Av. 1319	5	1632		5	1554	Dipped
6	1181	Av. 1163	6	1033		6	1511	Dipped	6	1286		6	1648	Av. 1647	6	1537	
7	1174		7	1038	Av. 1042	7	1515		7	1286		7	1662		7	1565	Av. 1560
8	1169		8	1055		8	1602	Av. 1493	8	1258	Av. 1274	8	1681	Dipped	8	1580	
9	1117	Av. 1119	9	1037	Dipped	9	1362		9	1279		9	1626		9	1600	
10	1072		10	1000		10	1509		10	1175	Dipped	10	1546	Av. 1612	10	1471	Av. 1502
11	1080	Dipped	11	1036	Av. 1028	11	1550	Av. 1521	11	1246		11	1665		11	1536	
12	1063		12	1040		12	1504		12	1348	Av. 1292	12	1594	Av. 1665	12	1594	Dipped
13	1134	Av. 1119	13	1043		13	1492	Dipped	13	1283		13	1699		13	1488	
14	1160		14	1047	Av. 1106	14	1382		14	1324		14	1702	Dipped	14	1543	Av. 1531
15	1126		15	1228		15	1444	Av. 1146	15	1407	Av. 1377	15	1702		15	1564	
16	1086	Av. 1089	16	1222	Dipped	16	1413		16	1401		16	1709	Av. 1650	16	1519	
17	1057		17	1218		17	1497		17	1426	Dipped	17	1593		17	1532	Av. 1562
18	1100	Dipped	18	1222	Av. 1226	18	1482	Av. 1468	18	1360		18	1650		18	1635	
19	1000		19	1232		19	1426		19	1499	Av. 1434	19	1554	Av. 1510	19	1540	Dipped
20	1067	Av. 1049	20	1211		20	1468	Dipped	20	1444		20	1550		20	1500	
21	1081		21	1165	Av. 1182	21	1408		21	1462		21	1427		21	1563	Av. 1540
22	1068		22	1172		22	1335	Av. 1369	22	1503	Av. 1452	22	1613	Dipped	22	1559	
23	1034	Av. 1044	23	1178	Dipped	23	1366		23	1392		23	1538		23	1533	
24	1032		24	1155		24	1430		24	1393	Dipped	24	1546	Av. 1536	24	1381	Av. 1478
25	1025	Dipped	25	1179	Av. 1194	25	1480	Av. 1464	25	1496		25	1524		25	1522	
26	935		26	1248		26	1483		26	1477	Av. 1516	26	1594		26	1515	Dipped
27	965	Av. 971	27	1310		27	1320	Dipped	27	1555		27	1569	Av. 1565	27	1424	
28	1014		28	1278	Av. 1274	28	1312		28	1455		28	1534		28	1549	Av. 1486
29	1000		29	1234		29	1326	Av. 1437	29	1579	Av. 1549	29	1570	Dipped	29	1487	
30	1033	Av. 1027	30	1256	Dipped	30	1374		30	1615		30	1400		30	1540	
31	1049		31	1248		31	1393					31	1537	Av. 1437			

SCHEDULE XVII.

The "Isometer".



The apparatus delineated above is one devised by Dr. Watkins-Pitchford and named by him the "Isometer". It is used for the estimation of the exact percentages of arsenic present in any sample of dipping fluid. Two tubes, one of which is graduated, are held in a metal frame attached to one end of the containing wooden case. This frame serves as a stand for the testing apparatus which is blackened to prevent reflection of light through the fluids.

The right hand tube is filled with the dip fluid to be tested. The method of testing is briefly as follows:—The left hand tube is filled by the coloured testing fluid as far as the first mark on the tube. The dip in the right hand plain tube is then poured cautiously into the second or graduated tube, where it mixes with the testing fluid. As the mark numbered ten is approached in this latter tube the colour of the fluid gradually changes, and when the mark is finally reached the tints of the two tubes are exactly alike. When, however, the dip to be tested is stronger than the standard "Laboratory Dip" the identity of colour of the two tubes is reached before the fluid reaches to the mark 10. Conversely when the dip is weak the column of fluid is not matched in colour until it reaches above this mark. The point at which colour correspondence between the two tubes takes plece is noted on the graduated glass scale of the tube, and the number of this graduation is found upon reference to an accompanying table to give the exact amount of arsenite of soda or of water which is necessary to bring the dip to the standard strength.

Strangles or Nieuwziekte.

By J. F. Dunning, M.R.C.V.S., Veterinary Division (Transvaal.)

This is an infectious and contagious disease of equines (i.e. horses, mules, and donkeys) due to a specific micro-organism—that is, an organism which can only be seen with the aid of a microscope, and which, if taken in any manner whatever by any other equine (provided the latter has no natural or acquired immunity), gives rise again to strangles. This point with regard to the infectious and contagious nature of the disease is very important if any horse-breeder wishes to prevent it or eradicate it from his stud. Therefore as soon as an animal is suspected of suffering from this disease it, and all its belongings, such as feeding, watering, grooming utensils, bedding, etc., should be removed to some place of isolation; and the attendant should not handle or approach other equines unless he has disinfected his hands and boots after attending the sick animal. This isolation is better adhered to until all nasal discharge ceases and abscess wounds are healed. Bedding, manure, etc., must then be burned, utensils washed in a disinfecting solution of standard strength, and if the sick animal has been kept in a loose-box or stable this same disinfecting solution can be used for scrubbing the walls and manger and sprinkling the floor. Even with all these precautions so infectious is the disease that it often appears amongst the other equines.

Susceptibility.—Young animals are most frequently attacked. This is no doubt to a large extent due to the fact that those past middle age have already had it. One attack is supposed to give a life-long immunity, but I believe that, if exposed to a strong contagion, especially if with a system already weakened by some other disease, a reinfection will occur.

Predisposing Causes.—Chills from a draughty, cold stable, or exposure to cold rains, etc., weaken the animal's resisting power and cause a condition of the respiratory track favourable to the development of this specific strangles organism.

Symptoms.—The usual symptoms are at first similar to those of a common cold. The animal coughs, looks dull and depressed, has a rise of temperature, and usually has a difficulty in swallowing. In a few days a discharge more or less copious takes place from the nostrils, and later an abscess forms between the branches of the lower jaw (though there are many mild cases of this disease in which this abscess never appears, the animal getting over it lightly with symptoms only of a common cold, and in which a microscopic examination of the discharge would be necessary to find out the difference).

Confusion of this disease with Glanders.—The veterinary surgeons of the Agricultural Department are commonly credited with not knowing the difference between these two diseases, and for this reason

many horse-owners are afraid to report any sickness. This lack of confidence is very regrettable, and, if the disease be glanders, often leads to serious loss. It has happened that both diseases have been present at one and the same time in the same mob, and maybe in the same animal too. Hence arises much confusion of symptoms and a position of affairs which, though capable of being understood and interpreted correctly by the professional expert, cannot possibly be by the lay individual. Again, a mild attack of strangles in which the symptoms are merely a slight enlargement and soreness of the glands under the jaw, accompanied by a nasal discharge, bears a strong resemblance to glanders, though in the latter disease ulcers can nearly always be seen on the pink lining of the nostrils. If any doubt, however, exists as to the real nature of the disease the "mallein test" (which is a scientific discovery recognized and used in all the countries of the civilized world, and not merely a South African invention with only a doubtful local standing, as many people think) can be applied by a qualified veterinary surgeon.

Treatment of Strangles.—If you live near a veterinary surgeon get him to look at your animal and follow his prescription. If not, then, in addition to the previously mentioned rigid isolation, keep him warm and comfortable and feed on soft food, and attempt by poulticing and fomenting—or blistering—to bring the throat abscess to a head as quickly as possible.

When this has been accomplished take a clean sharp-pointed knife and puncture in the centre of the swelling, and squeeze and wash out cavity. The animal can also be steamed by holding his head in the mouth of a sack, at the bottom of which is a bucket of hot water with a little eucalyptus oil in it. This has the effect of loosening the discharge and making it come away more freely. (In animals which run on the veld, and for which the owner has no accommodation, but little can be done except blister the throat and open the abscess when pointing.) If difficulty in swallowing is noticed, gruels and milk can be given instead of mashes. On no account try to pour food or medicines down the animal's throat.

Complications.—(1) In some cases, usually those in which no attention has been given, absorption of matter takes place from the throat abscess, and, as a consequence, secondary abscesses form in various parts of the body. If they appear externally they can be easily opened and treated, but if internal the animal will usually die from a gangrenous pneumonia or through some other vital organ becoming affected.

(2) Again, many of the animals which have a severe attack are left the victims of respiratory trouble shown by hurried and noisy breathing when asked to exert themselves.

Remarks.—Various owners have different methods of treating the animal with a view to aiding its recovery. Some of these are of extremely ancient origin, and must date from the time when medicine and surgery were in their infancy and not State-recognized sciences. Example, galloping the poor beast, or smoking him with some extremely irritating material such as tarred rags, in the hope that in the paroxysms of coughing caused by it the abscess might be burst. These methods cannot be too strongly condemned; they are not humane, and increase—instead of relieving—the animal's pain and distress.

I have made no mention in this article as to what medicines should be given, as strangles is a disease in which scientific nursing is of more avail than all the medicines. Moreover, the latter should never be used indiscriminately in any disease just for the sake of "doing something for him", but only to treat prominent and dangerous symptoms and on the advice of a professional man.

Pineapple Export.

RESULTS OF NATAL EXPERIMENTS.

In his annual report Mr. Claude Fuller, Natal Entomologist, gives an interesting statement of the results which have been obtained in connection with the experimental export of pineapples from Natal to England. He says:—

For several seasons past experimental shipments of pineapples have been forwarded to London from Natal. These experiments were undertaken with a view to ascertaining the best means of packing and forwarding the fruit and also some idea of the market value.

It has to be borne in mind that from picking day in Natal to the London saleroom represents a minimum period of twenty-three days, and, to include all districts suitable to pine culture, lengthens out to thirty days.

In some ways these trial shipments have held out a great deal of promise, but they have also provided many disappointments. They have been somewhat spasmodic, and at best only indicate the lines upon which an extensive series of trial shipments should be made to ensure the successful export of pineapples from South Africa.

Experiments have been made with both the small "Natal" pineapple and the larger "Cayenne". Later, these are dealt with under separate headings, and, unless distinctly implied, what applies to one does not do so to the other.

Both of these strains have been cultivated for a number of years and in a sense may be regarded as the survivals of the fittest. As a matter of fact, however, they are original introductions, and but very little in the way of introducing and testing other varieties has been attempted. Mr. F. A. Barker, of Malvern, has tried some other varieties of which he has preserved a Jamaican variety; this he regards as superior to the small "Natal". The late David Brown, of Darnall, produced several hybrids from seed, which he obtained by cross-fertilising, but these have never been tested.

The two established strains are popularly spoken of as the "Small" and the "Queen". The "Small" is preferably described as the "Natal Pineapple" and the large as the "Smooth Leaved Cayenne". There may be some doubt as to exactly what variety the smaller pine is, although it has recently been recognized by Mr. Fawcett, the late Director of the Jamaica Botanic Gardens, as the "Ripley", but it undoubtedly belongs to the "Queen" group. The identity of the larger pine is not open to much question, and the name "Queen" which it has earned locally, I suppose out of respect for its regal appearance, is singularly unfortunate. . . .

SUMMARY OF RESULTS OF EXPERIMENTS.

I. SMALL PINEAPPLES.

1. The greatest drawback to successful pineapple shipment appears to be the disease known on the London market as " Speck " and more properly described as " Fruitlet Core Rot ". The trouble is well known to growers, and diseased fruits on being cut across show brown streaks radiating from the centre outwards. This is due to a fungus which is not regarded as an active parasite, but is almost always to be found upon the dead remains of the floral parts in the eye-cavities of both sound and unsound fruits. It is presumed to gain an entrance to the fruit through abrasions of the walls of the cavities made by insects and mites inhabiting them. As a general rule the older the plantation the more prevalent is the disease; it is, however, as likely as not to be found in a new plantation. It can generally be detected in quite ripe fruits, but by no means always, and may be present without the slightest external indication. In green or colouring fruits it is impossible to detect, and in making up shipments for the ventilated hold the packer can do nothing to exclude such as are likely to show the defect later.

2. The shipment of pineapples by cool chamber is satisfactory and safe, but the freight is far too heavy for this class of fruit. It may be said definitely that fruit sent in the cool chamber will open up in the same condition as it was when packed. In other words, if it is not fully coloured when packed it will not be fully coloured when opened up. It is true that in our experiments there was always a slight improvement in the colour of the fruits, but this must have developed before the fruits became cooled down. It was found that partly coloured fruit would not colour up after being subjected to a temperature of 35° to 38° F. for so long a period.

For export by this method fruit must be fully coloured. As fruit colours up nicely after packing there is no reason why shipments for the cool chamber should not be prepared and kept back for a few days or a week so that the fruit may be well coloured before coming under the influences of a cool temperature.

3. Just as the London market favours oranges " deepening almost into red " so with pineapples. The deep red of the pineapple is, however, somewhat of an artificial colour. Although it is scarcely ever produced upon the plants it is not difficult to secure a rich red colour by picking the pine when partly coloured and packing it away, free from draught, and opportunity for excessive transpiration.

4. With certain reservations the shipment of small pineapples by ventilated hold is a practicable proposition. In our first experiments during March it was found that dark green pines arrived in very good condition and well coloured, " deepening into red ". Later, experiments with midsummer fruits showed that, whilst the fruit arrived when coloured and apparently in good condition, the core of the fruit had become a dark brown colour. In this connection I have just recently been informed that in a series of shipments of green fruits sent by ventilated hold from the Cape Province a couple or more years ago a similar state of affairs arose in the midsummer shipments and gradually disappeared as the season advanced. Experiments now indicate that to carry at all successfully by ventilated hold the fruit must be picked just when a patch of yellow appears amongst the green. If, in the course of further experiments, this also fails then the transportation of pineapples by ventilated hold during the rainy season of

the year is out of the question and the cool chamber must be relied upon for the shipment of the main crop.

5. The brown core referred to above never appears in fruits which ripen up on the plant and must not be confused with any disease or physiological trouble of similar appearance. It is directly due to the plant's activity during the hot and wet conditions, which do not permit of the maturity of the core; or, in other words, it retains some of its stalk functions and still acts as a connecting link between the crown and the root. Because of this there is a certain amount of movement of incompletely elaborated juices in the core, and the brown colour supervening is due to chemical changes. So, with dark green pineapples, otherwise "fit to pick", it would appear that the degree of ripeness necessary does not occur until at least some colour has appeared.

6. The crown is, of course, an important feature of a pineapple. The fruits from young plants (one to three years) always have good ample crowns and only occasionally are these too large. As the plants become older the crowns are more reduced, the bracts harder; in short, they become spiny, elongated rosettes.

For export purposes a good crown is desirable, and no pines should ever be shipped with double, treble, or bent crowns; also when packing one must be careful not to bend the crowns as they become "fixed" *in transit* and cannot be straightened afterwards.

Shipped in the cool chamber the crowns on opening are as fresh and good as when packed. In the ventilated hold, however, good crowns always show some of the tips of the bracts brown and withered on opening. This appears an insurmountable difficulty and it naturally decreases the market value of the fruit. The only thing in favour of the short, spiny crown is that it is not so subject to this defect, the bracts being more hard and woody.

7. Taking the "Natal" pineapple crop as a whole the fruit runs from 1 to 2 lb. in weight, the latter size being exceptional. The majority of the pines are from 12 to 18 ounces, and the good pines run to 1½ lb. Repeated advice has been given from London to send only fruit of 2 lb. and upwards. On this point I have to say that our experiments at Winkel Spruit farm have shown that crops can be produced running from 2 lb. to 3 lb. per pineapple, providing that the replanting system is followed accompanied by manuring. There the plantations are only allowed to produce two main crops and the plants are then cast and the area replanted. To produce good fruit is has further been found that it is best to plant only suckers to the avoidance as far as practicable of ratoons. At the same time plants which sucker too freely, running more to sucker than to fruit, should be avoided.

8. In harvesting the crop our experiments showed that the greater care exercised the better would be the external appearance of the fruit. All pickers were supplied with thick leather pruning gloves and the bottom bracts below the fruit were carefully cut off, instead of being torn away, as is the usual practice. Further, no pine was allowed to come into direct contact with another; most certainly the pines should not be stacked or heaped one upon another as the rind is liable to injury from the sharp thorns of the crown bracts.

9. The fruit should always be cut and 1½ to 2 inches of stalk left. The cut should be straight across and not slanting. There is no object or advantage to be gained by sealing or singeing the cut ends. On no account should fruit that has been broken off from the stalk be shipped.

10. Pineapples should always be sized and graded when packing. Each case should contain either one or two dozen fruits. The fruits should be described by the weight and at least two grades should be made, the fruits of the first grade being those with the best crowns. Pines with any defects should never be shipped. Such terms as "fancy", "giant", "extra large", or "large" sound absurd in the case of so small a pineapple, and should be avoided.

11. Bearing on the selection of boxes our experiments showed that for ventilated hold shipments the use of single layer boxes was imperative. It may also be said that for cool chamber they are equally advisable. At the same time double layer boxes, provided they hold not more than one dozen fruits of $1\frac{3}{4}$ to $2\frac{1}{2}$ lb. in weight can be used, and of course a considerable amount of space, and consequently freight, saved.

12. Pines are always packed in alternate positions, whether a single or a double layer package is utilized. In single layer packages, boxes to take two rows of fruits, about two dozen, should be adopted as a certain saving of space is thereby effected. Wattle-wood boxes have been found quite suitable for export purposes, and can now be obtained at a cheaper rate than the imported white wood. (*Note.*—Orders for wattle-wood boxes should always be placed well ahead of time so that the manufacturers can supply seasoned wood.)

13. Closed boxes should be used for shipments by ventilated hold, the spacing for ventilation being very little. It has been found that pineapples packed and kept loosely, so that the air could get to the fruit somewhat freely through the packing material, acquired a leaden grey colour, rendering them most unsightly.

14. Well shredded, *thoroughly dry*, and white mealie-cob husks have been consistently recommended as the best packing medium for pines. The difficulty experienced in our experiments was to get this sufficiently shredded and twisted. The fine grades of woodwool, such as are used for the shipment of peaches and plums, as has been experienced in other parts of the world, proved disadvantageous for pineapples. The best packing material, readily available, proved to be coarse woodwool of that quality usually employed in packing crockery. Owing to small local demand local purchases of this line were as costly as those of good quality woodwool. This is probably only a question of supply and demand, but in purchasing woodwool growers can always do better by importing direct than drawing upon local supplies.

15. In packing woodwool should be used above and below the fruit and to protect it from the sides of the boxes. A little should be placed between the fruits to keep the crowns off the bases of the adjoining fruits. The pack should be a tight one as loose packing leads to bruizing.

16. It is considered preferable, although not essential, to wrap each pine in a couple of layers of soft paper. For ventilated hold shipments it is suggested that the crown should also be wrapped. Before wrapping the fruit should be brushed with a fine bannister broom to remove any grit and sand.

17. The application of preservatives containing formalin to the rind of pineapples proved most disastrous.

II. THE SMOOTH-LEAVED CAYENNE.

1. These pineapples can only be shipped by cool chamber and upon that account must be fully coloured before coming under the influences

of the low temperature. For this purpose they should be allowed to colour up as far as possible upon the plant and then packed and kept back until fully coloured.

2. The "Cayenne" is properly regarded as too delicate for shipment over long distances and the local strain is particularly so. It has two further drawbacks inasmuch that the pulp is very watery and the pines display a great tendency to bleed or leak their juices. This bleeding is entirely due to the excessive amount of juice stored in the fruit. It may occur on the plant, also through a slight jar when handling and even later when the fruit is packed and *in transit* to its destination.

3. The fruits which carry the best are small ones from old plantations, weighing 2 to 3 lb.; they are of the same value as equally sized small "Natals" and may even fetch a better price all round. Upon the whole a small ripe "Cayenne" may be regarded as commendable as an export line.

4. Our shipments only justify the expectation of 12s. to 18s. per dozen, all round, as a steady price for well coloured sound "Cayennes" of 3½ to 5½ lb., and as charges may be reckoned at 8d. per fruit, including cost of boxes, it does not leave much margin for any untoward circumstance. There is further room for experiments in shipping this variety, but it would be better to improve the strain, or secure a less watery strain, to attempt them with.

5. Such pines should be packed in the field so that they may have as little handling as possible; 2½ to 3 inches of stalk should always be left attached to the fruit and it is essential that they should be packed with ample material, a good buffer of which must be placed between each fruit. The packing must, of course, be firm and tight.

Pineapple Culture in Natal.

By W. Johansen, Manager, Government Experimental Farm, Winkle Spruit, Natal.

The pineapple industry in Natal has not yet assumed very great proportions, owing to the fact that the local market has been the governing factor in controlling the supply.

Nearly all the best fruits to be seen on our markets are from first crops on newly-cleared, rich bush lands. It will, however, be shown in this article that it is possible to produce superior fruit by successive cropping on the same land, provided scientific methods are used.

In 1904 an experimental section of eighteen plots of pineapples was organized at the Government Experimental Farm, Winkle Spruit, twelve plots being dressed with different mixtures of chemical manures and six control plots with no manure in order to discover the effect on the development of the fruit and its flavour.

Owing to the fact that the whole of this farm consists of undulating land the experimental section was located on a steep incline, and the occurrence of abnormally heavy rains in May, 1905, causing great washouts, the whole experiment was disorganized and no authentic results were obtained.

However, by constant observation of the progressive growth of the fruit from season to season it became apparent that a great improvement in the size and quality of fruit could be effected by the application of certain methods, including the judicious use of chemical manures.

With this end in view small plots were arranged, some being planted with good, strong, healthy suckers; others with ratoons, and others with weak suckers.

It was found that the strong, healthy suckers made far more vigorous growth than either the ratoons or weak suckers, producing strong plants which maintained their supremacy in every phase of development from young plant to fruit.

Of the four parts of plant and fruit which can be used for propagation, i.e. the " sucker " (which grows from the stem of the parent plant), the " ratoon " (which grows from the roots of the parent plant), the " gill-sprouts " (growing on the base of the fruit), and the " crown " (taken from the apex of the fruit), the sucker stands out alone, and should always be planted in preference to any of the others mentioned.

In the event of suckers not being procurable, ratoons could be planted, but it is necessary before planting to break off from 1 inch to 3 inches of the base of the stem and to strip at least from four to six leaves off in order to allow the young roots free access to the soil. When first planting ratoons here it was often a puzzle to me why they did not make any headway, and on investigation the roots which grew

from about the eyes in the axis of the leaves were found to be growing round and round the plant under the leaves, resembling the disease known as tangleroot, the roots gradually growing tighter and tighter, apparently choking all life out of the plant.

Gill-sprouts and crowns cannot be recommended for planting except in special cases, such as trying to increase the number of plants from a selected variety not obtainable in the country. It has been my general experience that plants from gill-sprouts and crowns do not fruit under four years from time of planting.

Having satisfactorily proved the best part of the plant to use for propagation, plots were laid out and planted. Notwithstanding the fact that in these plots all suckers were taken from the same variety and grown under similar conditions, there was distinct variation in development; those suckers taken from plants with few suckers showing speedier and better development of plant and fruit than those taken from plants with many suckers.

Plots being established with a good uniform growth of plant, experiments were conducted with a view to ascertaining the influence of chemical manures on the growth and development of the fruit.

Sulphate of ammonia proved very effective in promoting a luxuriant growth of the plant, and in all cases where it was used alone, or in conjunction with other manures, it proved its worth, a distinct increase in size and rapidity of growth being most noticeable.

Superphosphate (high grade) was used in various quantities and proved a decided acquisition, but the best continuous results were obtained by the use of small quantities, i.e. 100 lb. to the acre.

The manure giving by far the best results was potash, producing larger, more succulent, and better flavoured fruits than manures in which other ingredients predominated or in which potash was absent.

Experiments were carried out with varying proportions of different manures, and without exception the development of the finer qualities of the fruit was most marked where potash was the predominant factor.

In some cases muriate, or chloride of potash, was the kind employed, and although the results of its use were better than those produced without any form of potash, it failed to reach the high efficiency of sulphate of potash. There is no doubt the chloride in the muriate of potash has a detrimental effect on the pineapple, as some of the pines, although well developed and maintaining their rich flavour, were found to be lighter in colour, and when cut the pulp was quite white.

Excellent results were also obtained by the use of woodash. In fact it is a question whether it is not equally as useful as sulphate of potash for producing large-sized fruits. Used in conjunction with sulphate of ammonia, some specimens of the Natal Golden Queen pineapple were produced up to 3 lb. 10 ozs. in weight; the only fault with the specimens was the excessive size of the crown. Whether these results are due to the lime contained in the ash reacting on the soil I have not yet determined, sufficient time not having elapsed since the inauguration of experiments to allow of absolute results being obtained.

A very prominent feature of our experiments has been the very rich flavour of the fruits produced by the use of 120 lb. sulphate of ammonia and 100 lb. sulphate of potash per acre.

The largest fruits were, as previously stated, produced with the use of 1000 lb. woodash and 120 lb. of sulphate of ammonia per acre, but the most uniform, the best keeping, and the easiest fruit to pack (having moderate and well-formed crowns), were secured by the aid of the following mixtures, i.e. 100 lb. superphosphate, 100 lb. sulphate of potash, and 500 lb. of woodash per acre. I can therefore strongly recommend the above mixture to growers who intend taking up the industry on a large scale for either export or local purposes, as there is no doubt a well-shaped, uniform fruit with a moderate crown packs better and has a superior appearance when placed on the market to a fruit with a large crown and conical in shape.

In 1909 experiments were conducted by the Government Entomologist (Mr. Claude Fuller) with a view to ascertaining the best methods of exporting pineapples to England, and although only a few cases were sent, definite facts were discovered which received ample confirmation when exportation was conducted on a much larger scale this season (1911). If it were possible to obtain the fruit it would be advisable to carry out shipping experiments even more extensively than we have yet done, and also for a much longer period, in order to confirm our results and data to hand.

In our first shipments this season fruits were principally picked green, although fully developed, and transported in ventilated hold and allowed to ripen on the voyage, sample cases being retained and stored here for comparison. Fruits were carefully packed in coarse woodwool—which retains its springiness far better than fine woodwool—after being wrapped in fine rice paper. On arrival in England the fruit appeared to be in good condition and appearance, but they had all developed a black heart, which was not noticeable in any way from outside appearance. It was at the end of twenty-three days that we first opened our sample cases of fruits and found each pine had developed the black heart, besides having lost a large proportion of its fine rich flavour. Upon examination all fruits picked green were found to have developed black heart in various degrees.

Several cases of fruit which were picked fully developed and just turning yellow were found to have carried better than the green fruits; only a small percentage were found to have the black heart, and then only in a mild form.

This black heart develops in rather a peculiar manner, starting from the centre of the core and working towards both apex and base of the fruit without extending much laterally. This deterioration may reasonably be attributed to the picking of the fruit in an immature stage.

The facts discovered in the first experimental shipments in 1909 were that pines picked fully ripe, of a uniform golden colour, and shipped per cool chamber would arrive in England in precisely the same condition as when picked; that good prices would be obtained which would leave a fair margin of profit, or about 3s. per dozen net, notwithstanding the heavy shipping rates for cool chamber; that fruit should be packed tightly in cases with good packing of coarse woodwool; that fruit should be uniform in shape and not conical; and that crowns should not be too large.

Fruits picked and shipped in this condition do not lose their flavour, and the net results of these experiments indicate that the cool

chamber method of transportation is the best, and proved the necessity of picking ripe pineapples for the purpose.

The average weight of the pineapples exported was 2 lb. 8 ozs., and the depreciation during transit, when cut green and shipped per ventilated hold, is more than one would naturally expect, the average loss being about 6 ozs., according to weights received of shipments from London. When fruit is cut ripe and sent by cool chamber the loss in weight is very little, only averaging about 1½ ozs. each fruit.

That the export of the more plentiful and smaller grade of pine will not pay is quite evident from the poor prices obtained for a small shipment which was sent at the end of our season. It is thus imperative that care and skill be exercised in the selection and cultivation of good varieties and the maintenance of a good standard.

The Golden Queen of Natal has been found a most satisfactory fruit for export, possessing the qualities of size, succulence, and flavour.

The Jamaica pineapple which we imported some time ago does not give promise of being useful for export, being too conical in shape and producing numbers of gill-sprouts which, when broken or cut off, spoil the appearance of the fruit.

The St. Michael is a very fine fruit, weighing up to 7 and 8 lb., with a fine, rich flavour, but too soft for export purposes. It should do well on our soils, and would realize good prices on local markets.

The Cayenne carries fairly well, as evidenced by a small consignment exported in 1909, but it has not a good appearance, being too flat in the bracts and generally of a dull red colour.

In cutting fruit for export great care should be taken not to bruise it, as the slightest bruise will nullify its value and result in the rotting of the whole fruit. Gloves should be worn by the pickers and fruit should be cut off with a sharp knife, leaving a stem of at least 2 inches. It is essential that fruits should be cut when quite dry, as moisture, even from dew, tends to heat the fruit when packed and causes rapid deterioration.

Rough woodwool or shavings has proved to be the best medium for packing, and rectangular cases—made to allow of ample ventilation—should be used.

Our experiments as to most suitable size of case to use for shipping purposes were not carried to any great extent, and this question must be determined by future consignments. The sizes mostly used in Florida are those carrying sixteen, thirty-two, and forty-eight, according to size of pines, but these packs seem quite unsuitable for our purpose.

Great care is necessary in grading fruit, as an even standard should be maintained.

In packing fruit first wrap each one in good, strong rice paper, then place in case which has been previously lined with woodwool, arrange the fruit so that the crowns and bases alternate, place a little woodwool between each, and pack tightly, but avoid bruising or crushing. Tight packing is highly essential, as consignments loosely packed arrived in England in an inferior condition.

The prices realized in England for consignments sent by cool chamber were up to 10s. per dozen, resulting in a net profit of 3s. per dozen. It is questionable if this profit will be sufficiently alluring to induce farmers to cultivate and export pineapples on a large scale.

There is, however, a local demand, and if fruit of a good size and quality be produced it should find a ready sale at prices which will allow a fair margin of profit.

The up-country markets can always be relied upon to take a large quantity, Johannesburg especially being a centre in which good prices are obtainable, providing a high standard of quality is maintained.

For the successful cultivation of the pineapple a chocolate, loamy soil is to be preferred in Natal, although both light, sandy soils and black loams have produced excellent fruit in other places.

If possible land having a north-easterly aspect should be chosen, in order to give the plants the benefit of the early morning sun.

Deep ploughing (about 8 inches) and good tilth is essential. Care must be taken in cultivating not to disturb the roots, otherwise fruit of inferior quality will result. Soils should be well drained and clayey sub-soils avoided.

The distance of planting adopted in our early experiments was 6 feet by 3 feet, but this was found to be an extravagant waste of land, as fruit equal in size and quality has been obtained from 2 feet by 2 feet plantings.

Our former method was to strip the plant of all surplus suckers each season. This, however, was found to have a deleterious effect upon the fruit. Under any conditions the pineapple plant should not be left in the ground more than three years, as fruits deteriorate to the extent of 6 ozs. per fruit each year. The most successful method adopted on this farm has been to take up the plants after removing the second crop, give the land a good ploughing, then manure and replant with good suckers.

Care must be taken that soil does not enter the centre of the sucker when setting out, as this stops all growth. The most suitable time for planting on the coast is from September to November; the plant will thus make a rapid growth and will produce its first crop within twelve months. Should the young or newly-set-out plants show a tendency to fruit at once, which often occurs, the young fruit should be knocked off. By this means a new sucker will develop immediately and will fruit at the same time as the main crop.

The coast lands of Natal are very suitable for the cultivation of the pineapple, the rainfall and temperature being equal to the requirements of the fruit. If attention be paid to the selection of the best varieties there is every reason to believe that a permanent and profitable industry may be established.

Steam Ploughing and the Maize Industry.

TWO VISITS TO VEREENIGING.

By LEONARD ACUTT, J.P., Tongaat, Natal.

IN February, 1908, I paid a visit to the scene of the extensive farming operations of Messrs. John Fowler & Co. (Leeds), Limited, at Vereeniging. I published a few notes taken at the time in the *Natal Agricultural Journal*. I have recently paid the property another visit, and I propose to give some notes of both visits for the information of the large number of readers of the *Journal* of the Union of South Africa.

FIRST VISIT.

I met Mr. McLaren (the able manager in South Africa for Messrs. J. Fowler & Co.) in Johannesburg and arranged to go with him that night to Vereeniging, so 9 p.m. found me at Park Station, and we were soon on board the Cape mail train, and a run of some two hours brought us to Vereeniging.

On leaving the train we found before us a flat, dark country. Some brilliant lights at long distances apart I took for lights on headgears of mining property, but was told that they were street lamps of the town of Vereeniging. They only made the darkness more visible, and were of no assistance in showing the way from the station to the Grand Hotel, where we stayed and where Mr. McLaren lives at present.

I "walked delicately" and trusted to my guide, who piloted me safely over several railway tracks and rough ground, and finally we went through a gate and reached our destination.

I may say that the above was my impression overnight, but it looked much simpler in the morning, and but for the street lamps I think the veriest novice might have found his way.

Vereeniging is a young but ambitious town, and there is plenty of room for growth of population. It boasts a municipality or corporate body of some kind whose duty it is to look after the place, and trees are being planted along the streets, and will probably afford good shade long before houses are built on the unoccupied lots. The present few inhabitants seem all to have had different ideas as to the direction in which the town would spread, consequently the town presents an appearance of extreme unsociability, not to say misanthropy, and, if there is a house to house postal delivery, it must tax the powers of one man, and give him a lot of travelling.

The town is situated close to the Vaal River, on the Transvaal side, but there is not much to be seen of the river from the parts of the town through which I went. The country round is a very slight rise from the river, and only a few low hills are visible in the distance, and as

there are no native trees and those planted are still in the "baby" stage, Vereeniging is not at present a pretty or cheerful looking town.

The railway workshops were here some years ago, and had they remained would have made the town, and some 2000 men probably would have been employed, but these works are now in Pretoria. Whether this change, which has so disastrously affected Vereeniging, was the result of some broad policy on the part of the Government or of some short-sightedness on the part of the then controllers of the property, we need not inquire, but the removal of the workshops has killed Vereeniging for the time being, but for the time being only. The large works going on, mining, tree-planting, and farming, the nearness of the Vaal River with its boating and fishing, and the easy distance from Johannesburg, must make a large town of it some day and justify the ambition of its founders in laying it out on a generous scale.

The country round for many a mile belongs to the Vereeniging Estates, Limited, their property consisting of 129,092 acres, of which 49,346 acres are situated in the Transvaal, and 79,746 acres in the Orange Free State. This means an area of over 201 square miles.

There are coal mines on the Transvaal side, which last year turned out 277,450 tons of coal of good quality.

On the Orange Free State side of the river a large area is devoted to forestry, and the number of trees already planted is, approximately, 3,225,000, of which 925,000 are oak trees. This latter shows that more valuable trees are being grown than the usual eucalypts and wattles.

I regret that I could not go over the mines or the forests. My visit was to Mr. McLaren, and it took all my time to inspect the work under his charge.

Messrs. John Fowler & Co., besides farming on a large scale, in order to demonstrate what can be done with steam plough cultivation, make this estate its headquarters in South Africa; here men are trained to working the machines, and drafted off as required all over the sub-continent, and here certain stores and spare parts of machines are kept which can be sent anywhere where they may be required.

It may be said that it does not seem exactly business to send a spare shaft or other piece of machinery to the coast of Natal when perhaps the same thing was landed at Durban, but as one never knows where a spare part may be wanted it is better to have one depot at Vereeniging than half a dozen in different parts of South Africa. It is easier to send a spare part from Vereeniging to Rhodesia or Cape Province than to send from Durban, and as the firm has so much going on here it obviously is the best arrangement for headquarters.

The firm works the land on shares, paying to the proprietary company a percentage of the gross sales of produce. Mr. McLaren gave me some details of the results of working, but I cannot give them, nor is it necessary. The following paragraph, taken from the report of the last meeting of the Vereeniging Estates, Limited, is sufficient proof that the arrangement is profitable to both parties, for if it were not so the company would not extend the acreage, nor would Messrs. John Fowler & Co. increase their responsibilities :—

"On the north bank of the Vaal River the steam ploughing operations carried on there have been appreciably extended during the year.

Excellent results are being derived from these operations, and, in order as much as possible to encourage their expansion, your directors have placed certain additional portions of land at the disposal of John Fowler & Company, Leeds, Limited, which company is conducting these operations under an agreement with this company, from which this company derives substantial revenues."

There are at present between 7000 and 8000 acres ploughed up, and between 3000 and 4000 acres in mealies for crop, the balance of the land being either in fallow, or in mealies sown thickly for green soiling, or in other crops.

We began our inspection after breakfast by going down to the store on the railway siding. This is a large galvanized iron building on brick and concrete foundations. It formed part of the equipment of the railway workshops, and was purchased by Mr. McLaren from the Railway Department. He wishes now that he had acquired several of them, but at the time he could not foresee that his operations would attain their present magnitude.

The first thing to which my attention was called was a mealie mill by Corbett & Son, of Shrewsbury, the largest size made by them. This is a very effective machine, and gives every satisfaction. It is size X.L. 3, with 22-inch vertical steel plates, and does all the work of the farm.

We then entered the shed, and walked through narrow passages between the stacks of bags of mealies, at times over 20 feet in height. It did not feel comfortable in these narrow alleys, and pictured a "creep" taking place in the stacks, and how easily one might get "nipped". At intervals on the floor were placed saucers containing water and sugar and arsenic, and this is said to be very effective in keeping down rats, mice, and other vermin.

The firm having an order for some 3000 bags of mealies, the reaping machine was drawn up alongside the shed, and the winnowing and screening part of it was at work cleaning the grain before it was sent away. It was dealing with some 1000 bags in the day.

I noticed that the bags taken down from the stack were very open in texture, and many of them burst with the pressure. They are only 1¾-lb. sacks, and are the lightest I have ever seen used for 200 lb. weight of grain, and are not to be recommended. They may do for storing, but certainly for shipping or even railing nothing less than a 2¼-lb. bag should be used.

The combined stripper, cobber, and winnower with engine attached I studied with much interest, and hope some day to see it at work. The plan of working is as follows:—The engine, which is on two wheels, pushes the large platform on which is the machinery. This platform is also on two wheels only. The whole machine moves slowly forward on the field, the engine operating all the machinery besides propelling itself and the platform. Kaffirs go ahead and pick the cobs. They do not husk them, but fill them into sacks which are stood in a line on one side of the strip of ground which the machine is taking; as the machine travels along, these sacks are tipped into a hopper a little above the level of the ground; an elevator carries them up to the feeding hopper of the cobber and husker. This consists of a drum of some 12 or 15 inches in diameter and 5 feet in length, through which runs a shaft with two

blades along its length. These blades are sharply rifled for the first 18 inches, to draw the cobs in, and for the rest of the length of the shaft are only slightly rifled, perhaps not more than one-fourth or one-third of a turn. The shaft revolves at great speed and tears off the husks and strips the corn off the cobs, breaking up the cobs considerably, but leaving no mealies on them. I did not, of course, see this part of the machine at work, but only in motion.

The whole outfit when in operation is of great size. I have said that the engine and machine have only one pair of wheels each, and some idea of the over-all length may be obtained when it is borne in mind that between the two axles is a distance of 21 feet. There is a platform at the rear end on which is a weighing machine, and the corn is filled into sacks, weighed, and sewn up on board and dropped on the ground to be picked up by carts or wagons. The capacity of this is 500 sacks a day.

The engine, which, besides pushing the platform and operating the machinery, drags a water cart and carries a supply of coal, is 20-h.p., and weighs only 8 tons 8 cwt.

I found four varieties of mealies grown as main crop, and they were valued in the following order :—

(1) Horse Tooth ;
(2) Hickory King ;
(3) Golden King ;
(4) Natal Yellow.

Having finished inspection at the shed we took cape cart and drove for an hour or more up a gentle slope through section after section of crops or fallow, crops being mainly mealies, although there was a very good stand of mabele in some sections. These sections are about 31 acres each in area.

As we got some distance up the rise the view of the surrounding country was better and really grand in extent.

We reached at last the open veld clear of the sections, and Mr. McLaren called my attention to the length of the top line of the cultivation, which is quite five miles.

The soil so far as I could see is of a poor character and in places not very deep. There are two kinds of soil, a grey, light loam, and a red soil. This latter, while appearing to be of better class, does not give better crops.

Now, it will naturally be thought that, with such broad stretches of open, almost flat, country, the ploughs would take very long furrows, but this is not the case ; the maximum length of wire rope used is 450 yards, which gives an effective furrow of 400 to 420 yards. Between the sections are left broad strips of veld, or headlands, on which the engines work, and on which the plough is manoeuvred and guided into position. An engine stands at each end of a section to be ploughed, and a large machine to which the ploughs are attached is drawn backwards and forwards and the engines shift their position on the headlands as the work proceeds.

When the ploughs reach a headland, having, we will say, thrown the furrows to the right, on their return the furrows have to be thrown to the left, and how to construct a machine to do this was probably one of the great initial difficulties in the invention of the steam plough. The

American hill-side plough with reversible mould-board was doubtless thought of, but, as perfection of working, curve of mould-board, and consequent efficiency of work of these ploughs had to be sacrificed to their reversibility, they were not suitable to work the level, and some other device had to be adopted.

One, which I saw, but not at work, consists of a shaft carrying as many pairs of mould-boards as it was decided to use, each pair consisting of one right and one left hand mould-board. On reaching the end of the furrow after, say, a right-hind throw, the shaft is revolved, bringing the ploughs just used above the shaft and lowering the left-hand ploughs into position for the next cuts. This is a very ingenious machine and is used for light work, and can do 35 acres a day, but for heavier work what is termed the "balance" plough is used.

This consists of two iron beams, one carrying the right and one the left hand ploughs. The beam with the ploughs not being used is raised clear of the ground and the machine in motion presents the appearance of a ship with a heavy bowsprit working its way over a choppy sea. On reaching the headland the working set is brought out of the ground, and the beam with the other ploughs is lowered for the return trip. One would think that such a heavy mass would require a lot of men to operate it, but the two beams balance each other, so that the men working the ploughs can easily throw one set out of the ground and lower the other to the depth required. Very little time is lost at the end of the furrow. The engine which has not been winding has moved and got into position for the next pull. The plough is pulled well out on to the headland, the beam is pulled down, and the engine at the other end starts winding. By the time the ploughs reach the land again they are steered into position, and take the next cut.

The acreage under mealies is between 3000 and 4000, and the crops are all looking well. The yield of mealies is expected to exceed 25,000 muids. For the coming season's planting nearly 5000 acres are expected to be ready.

Mr. McLaren's system of farming at present is to take off a crop of mealies and then for the next season either fallow the land or grow some crop for green soiling, so that only alternate years is anything taken off the land. Thus, to keep up 5000 acres of mealies, it will be necessary to have 10,000 acres under cultivation. By resting and green soiling in this way it is expected that the productiveness of the soil will be kept up without any necessity for heavy outlay for commercial fertilizers, and it is probable that under this treatment the land will yield heavier crops in future years.

Asked about growing leguminous plants for soil enrichment, Mr. McLaren rightly said that, while fully realizing the importance of such crops, he could at present only go in for a "straight line" crop, and so for the present he relies on fallow or green soiling, the crop for this latter being mainly mealies sown broadcast and very thickly.

Some quite sufficiently comprehensive experiments are, however, in hand and some sections are, in whole or part, planted with rape, mustard, lucerne, beans, etc., and these will in course of time prove which is the most suitable crop. Some variety of cow-pea will probably prove the best for maintaining the fertility and condition of the soil. In the meantime

the heavy green soiling will prove beneficial for a few years, although it is well known and admitted that this can be overdone and the land rendered sour.

One of the ploughs was at work turning in a heavy crop of green mealies, and the mass of stuff was fairly cleanly buried. A heavy fluted roller was attached to the plough, and materially assisted in covering the crop.

Besides the main crop of mealies, attention is being given to cattle farming, and already some 300 head of well-bred stock are on the farm.

To provide water for the stock, several dams are in course of construction in suitable places.

Some large pits of ensilage, holding some 200 tons each, are being prepared. I saw one being filled, the material being smooth mealies in the cobbing stage, before any leaves had dried off. A chaff cutter operated by a steam engine was making short work of the wagon loads of stuff as they were brought up.

I must not omit to mention the fact that the farm is thoroughly equipped with implements of all kinds, planting machines, light and heavy harrows, cultivators, etc. The planting machine with which all the mealie planting is done has planted as many as 66 acres of mealies in one day.

The system seems to be to have the land perfectly clean from weeds and rubbish when the mealies are planted, and the only cultivation given afterwards is to harrow frequently with the ordinary zig-zag harrow, except in some few spots where a horse hoe or cultivator may be necessary.

The condition of the crops over the whole of the planted area is much superior to anything I have seen elsewhere, either in Transvaal or Natal.

The difference in the yield of the crop is claimed to be entirely due to the deeper tillage, but I am inclined to credit some of the increase to the fact that the land is ploughed over as soon as it has a covering of weeds and before they have heavily seeded, and consequently when the mealies are planted they have the land entirely to themselves, just at the time they require it most, and weeds do not make any headway until the crops of mealies are sufficiently grown to make them independent of weed growth.

Messrs. John Fowler & Co. are doing a great work at Vereeniging, and one the significance of which it is difficult to over-estimate. They are proving what can be done with steam cultivation, not only for Vereeniging and the Transvaal, but for the whole of South Africa, for there is nothing specially favourable in the circumstances at that farm either as regards soil or climatic conditions. What can be done there can be done on a large scale in the Transvaal and Orange Free State and probably in Cape Province, and on a smaller scale in Natal; and we cannot doubt that there are millions of acres in South Africa as suitable in every way for the growth of mealies as the land at Vereeniging, where crops over a large area have averaged 8, 10, and 12 bags to the acre.

But, although the field for the employment of capital in growing mealies on a large scale is, in itself, immense, there is a still wider field in combined stock and mealie farming, which has potentialities not sufficiently recognized. The summer veld on South African farms will

carry an enormous number of sheep and cattle, but the winter feeding has been, and is, the difficulty, and one which caused our old Dutch pioneers to become almost nomads and move about towards the fall with their families, their flocks, and their herds in search of pasture. But with a large acreage of mealie stalks and a little ensilage, a fully stocked farm would have no difficulty in carrying the stock through the winter, and the profits of such combined mealie and stock farming on a large scale it is difficult to estimate.

Mr. McLaren is fully alive to the importance of having cattle to utilize the quantity of winter food which is now wasted. He has, as I have said, already some 300 head of cattle, and these, far from falling off in the winter, will probably come through without any check to growth or loss of flesh. I suppose if he had 2000 head they would find enough food on the mealie lands to keep them in condition through the cold and dry season, and I fully expect to hear, and I hope to see, that the stock running on this estate, or the portion of it worked by Messrs. J. Fowler & Co., number over 2000 before many years are past.

I can see no reason why South Africa should not become one of the large mealie producing countries of the world; and, while growing the mealies, we shall solve the question of food for stock in the winter.

While believing that we are on the eve of great developments in the produce of mealies, I am not hopeful that the small farmer will be a large factor; and this is the only unpleasant reflection I have when I think of my visit to Vereeniging. I am of this opinion because I consider that only by the use of the steam plough can such results, on such a scale as we see at Vereeniging, be attained; and the steam plough at present is not within reach of the small farmer, although co-operation may in time overcome this difficulty.

I say only by use of the steam plough can good results be obtained, as only by its means can land be ploughed at any time of the year.

How often have we seen old mealie fields with a rank growth of weeds in seed waiting for rain before it could be prepared for next crop? When eventually the necessary rain came, only an indifferent ploughing was possible, and when the mealies were planted the ground was so full of weed seeds that the mealies never got a fair start, and no amount of horse hoeing could keep the weeds down.

To make mealie-growing pay, the land must be turned over before the weeds have seeded heavily, and this can only be done by steam ploughing. This seasonable culture kills the weeds, and probably would do much to eradicate "grub" and other pests in course of time.

Groups of farmers may combine to purchase and work a steam plough, but, looking at the question broadly, the large export of mealies to which South Africa may undoubtedly look forward, will be the result of large farms and not small ones. I am aware that some districts can work their land all the year round, but I am looking at the vast plains of the Transvaal and Orange Free State, and here the farmers certainly are dependent upon rain to enable them to plough their land.

In conclusion, I have to express my thanks to Mr. W. A. McLaren for giving me such an interesting and instructive day, and I hope I may see the property under his charge again, when it is more fully developed, for, in spite of the amount of work going on, it is still in its infancy.

SECOND VISIT.

Vereeniging is rapidly becoming the Mecca of the agriculturist and pastoralist of South Africa, and it is a place of great interest to all classes.

I was asked by Mr. McLaren to join a party he was taking round the Estates towards the end of April last.

The party consisted of a sometime well-known South African journalist, a Johannesburg magnate, a member of a large English firm and his Durban representative, a Cape Province farmer, and myself.

We started in a powerful motor-car, Mr. McLaren acting as driver, and there not being much traffic, or any traps about, we made a good pace between the flood-water "cut-offs".

We came first to a section being cultivated to a depth of 15 or 18 inches, and those of our party who had not seen such machines at work before, were much struck with the ease with which the heavy implement ripped up the land.

Some harrowing next claimed our attention, three sets of light harrows taking an 18-feet width at a time were drawn by eight oxen. We were informed that there were 42 of these sets on the farms, each capable of harrowing 25 acres a day, and that 40 of them had actually been working at one time and harrowed 1000 acres in a single day. These are big figures for South Africa.

The next point of interest was the cattle kraal. Here the cows and calves were mustered.

The number of horned cattle now on the farms reaches nearly 1600; not so far from the 2000 which on my first visit I thought the farm would carry through the winter with the grand feed which is left on the ground after reaping the mealies.

The cows are "Cape" cows of no particular strain, but well selected, and there are some fine animals among them.

The bulls are Sussex, Hereford, and Shorthorns.

The last season's calves numbered 167, and there were only two deaths, and neither of them from disease, one succumbing to snake bite, and the other getting killed by falling into an ensilage pit.

The heifer calves were just weaned (last week of April) and the bull calves were being castrated, and were to run another month with the cows until they had recovered from the operation.

The cows and calves run together, and the cows looked somewhat pulled down and out of condition. Upon my remarking on this, Mr. McLaren admitted that it was so, but said that when the calves were weaned and the cows put on the mealie lands when the crop was harvested (which would soon be commenced) they would soon recover, and by the end of the winter be quite fat.

Besides the food supplied by the lands, large quantities of ensilage are made.

The operations have been much extended of late, and the mealie crop may reach 50,000 muids.

The acreage now under cultivation is over 10,000 acres, of which some 6000 acres are under mealies for crop.

The company has now control of over 20,000 acres of land.

Some 25 white men are employed the year round, and natives vary from 150 in the slackest time of year to 600 in the busiest.

Much to our regret the rain interfered with a full inspection, and we were unable to see some of the most interesting of the operations—my notes are consequently not so full as they might have been, but I trust that what I have written will be of some value and bring to the notice of our farmers the great work which is being done at Vereeniging.

A comparison of the figures given now, with those of three years ago, will show that great progress has been made, and there is room for indefinite extension.

I shall expect to find, although I am not aware of the policy of the company, that the pastoral branch of the business will receive the greatest attention of any extensions made.

The Tobacco Industry in the Western Province, Cape.

By R. W. Thornton, Government Agriculturist (Cape).

That the "proof of the pudding is in the eating" is fully borne out in the tobacco growing industry in the Western Province. This section of the agricultural activity of the west is fortunate in so far that the farmer is in a position to obtain tangible results from his labours at the end of every season. Unlike the general run of agricultural experiments, which seldom result in immediate monetary gain to the farmer, the experiments with both Turkish and American tobacco have amply rewarded the labour and expense entailed, as will be seen by the prices obtained at the annual sales of tobacco which have been held since the industry took shape.

The varying vicissitudes and fortunes attending the culture of the leaf have been fully set forth in the articles appearing in the *Cape Agricultural Journal* for May and September, 1910, and any one interested in the growth of an industry which promises to make no mean figure in the agricultural prosperity of the country is recommended to peruse these articles. The present short article is merely in continuation of those just mentioned, and particularly refers to the recent sale of tobacco grown during the 1910-11 season held under the auspices of the Capetown Chamber of Commerce on the 15th May, 1911. This sale is the fifth held in successive years and the second under the auspices of the Chamber of Commerce. Like its predecessors, the 1911 sale proved most satisfactory and the farmers concerned have cause for jubilation at the handsome profits obtained. As it is considered that from the auction method of disposing of the produce, and the resultant competition which it induces. farmers are likely to obtain on the whole far better prices than they would by selling their tobacco out of hand, it is trusted that the producers of tobacco in the Western Province will confine themselves to this mode of selling their produce. It is felt that in this manner they will in some degree assist the Government in keeping the industry within legitimate channels and thus contribute to its ultimate establishment on a sound and businesslike basis.

The total quantity offered for sale was very much in advance of that of last year, the total quantity of Turkish being 17,259 lb., as compared with 4160 in 1910, and the Virginian tobacco increased from 2990 to 3298 lb.

The Turkish tobacco realized this year £1760. 12s. 4d. and the Virginian £118. 10s. 5d., a total of £1879. 2s. 9d. Last year the Turkish tobacco amounted to £465. 6s. 11d. and the Virginian £99. 1s. 9d., a total of £564. 8s. 8d.

The highest price paid for the Turkish tobacco was 2s. 7d. per lb. This was obtained by Mr. J. A. Joubert, of Slang Rivier. Eliminating loose leaves, the lowest price was 1s. per lb. For the total quantity the average for Turkish tobacco was therefore 2s. 0½d. per lb., including loose leaves, and 2s. 2.79d. without. The loose leaves realized from 5d. to 9d. per lb. The average price paid for Virginian tobacco was 8½d. per lb.

Mr. A. J. le Roux, of French Hoek, obtained 2s. 7d. per lb.; the School of Agriculture, Elsenberg, obtained 2s. 6½d.; Mr. J. N.

Louw, of Wellington, 2s. 6d.; Mr. P. G. Marais, of Helderberg, 2s. 5d.; Mr. J. G. Carinus, of Stellenbosch, 2s. 4½d.; Mr. J. A. Joubert, of Calais, 2s. 4d.; Mr. G. J. le Roux, of French Hoek, 2s. 3½d.; Mr. D. H. Carinus, of Lyndoch, 2s. 3d.; Mr. Lambrecht, 2s. 3d.; Sir Meiring Beck, of Tulbagh, 2s. 2d.; Mr. P. H. Faure, of Stellenbosch, 2s. 1d.; Mr. P. O. Hugo, of French Hoek, 2s. 1d.; Mr. J. S. Hugo, of French Hoek, 2s. 1d.; Mr. A. du Toit, of Tulbagh, 2s.; Mr. W. Verster, of French Hoek, 2s.; Mr. A. Krige, 1s. 10d.; and Mr. J. A. Myburgh, of Vlottenberg, 1s. 3d.

For Virginian tobacco the highest price realized was 1s. 4½d. per lb. by Mr. J. A. Joubert, of Wellington; while Mr. A. S. Roux, of Paarl, received 9d.; Mr. P. H. Faure, 7½d.; and Mr. A. Krige, 6½d; Mr. J. Louw, of Wellington, and Mr. J. A. Joubert, of Calais, 5d.

When it is considered that the approximate cost per lb. of producing the tobacco is 7d. for Turkish and perhaps half this figure for Virginian, it will readily be observed that the cultivation of the leaf has hitherto proved most remunerative, and this special feature is not transitory, but on the contrary will not only be maintained but improved upon, for with the experience which comes with years and improved methods of cultivation, etc., it is not unreasonable to hope that the cost of production may be reduced materially, while with proper appliances for handling the leaf and the consequent turn out of an article of good quality the prices obtained must necessarily increase. There is still a large market locally for a high-class tobacco, and no fears need be entertained of overproduction; moreover, the demand will naturally increase with the growth of the population, and, although it is looking far ahead and many improvements must be made before it is possible, there is the market oversea to be taken into account.

The following table will bear out the statement that with experience a better article is placed on the market resulting in increased prices.

Statement showing average prices received for tobacco sold at the sales organized by the Government and the Capetown Chamber of Commerce:—

Year.	American.		Turkish.		Remarks.
	Quantity. lb.	Average, per lb.	Quantity. lb.	Average, per lb.	
		s. d.		s. d.	
June, 1907	—	—	3,241	1 6	Including loose leaves.
July, 1908	—	—	9,500	1 11	Part of this quantity sold out of hand.
June, 1909	—	—	10,500	2 0	3,000 lb. sold at sale. 7,500 lb. sold out of hand.
August, 1910 ...	2,990	0 7·95	4,159	2 2·85	Majority of yield sold out of hand.
May, 1911 ...	3,298	0 8·62	15,262	2 2·79	1,997 lb. Turkish loose leaves sold at average of 6·78d. per lb.
	2,015	0 10·33	16,803	2 5·24	Amounts as far as can be ascertained sold out of hand.

It will be seen that the price obtained has consistently increased every year (excepting the price obtained at the recent sale for Turkish tobacco, which remained almost the same as the previous year), but as far as the sale just completed is concerned it is only fair to add that in every case the experimenters who carried out the cultivation of the plant under the direct supervision of Mr. Stella, the Government Tobacco Expert, obtained higher prices than those growers who were unable to obtain this assistance and who in every instance received a figure below the general average.

Another feature worthy of note in the recent sale is that the average of nearly 2s. 3d. per lb. for Turkish tobacco was very consistently maintained on every lot put up for auction, and the fluctuating tendency observed at the previous sales, whereby some lots sold at low figures and certain others at high ones, thus establishing a fair average, was not in evidence. In fact, were it not for the poorer class tobacco offered by certain non-experimenters the 1911 average would have been higher.

The following table will demonstrate the growth of the industry under the aegis of the Government and will also show that a large quantity of the tobacco produced is sold out of hand instead of through the medium of the organized sales. It will not be inopportune to again urge upon growers the necessity of selling their produce only by these auction sales and thus contribute to the desired benefit to all concerned by placing the marketing of tobacco, at least, on a sound and satisfactory basis.

Approximate quantity of American and Turkish tobacco produced under direct or indirect Government supervision in the Western Province, Cape:—

Season.	American.	Turkish.	Remarks.
1905–1906	—	1,000 lb.	—
1906–1907	—	3,000 „	
1907–1908	—	13,000 „	—
1908–1909	—	16,000 „	Small crop owing to severe drought and cutworms.
1909–1910	5,000 lb.	40,464 „	—
1910–1911	6,698 „	67,173 „	—

CONDITIONS OF SALE.

As it may be of interest to some, the following conditions governing the sale are published.

Sellers and buyers must carefully note and adhere to the following:—

(a) The sale will be by auction.
(b) A suitable auctioneer will be appointed, and his charges will be borne by sellers in proportion to the quantities offered and the prices realized by each respectively.
(c) All tobacco for sale must be sent and no sale will take place through samples.
(d) All accounts against buyers will be paid to the Treasurer of the Capetown Chamber of Commerce, and sellers will be paid by the treasurer after deducting the auctioneer's fee of 2½ per cent.

(*e*) All tobacco for sale must be addressed to.................... (auctioneer).

(*f*) The carriage of all consignments must be paid by the senders, and no tobacco will be received for sale upon which carriage has not been paid.

(*g*) The tobacco must be delivered to..................(auctioneer) not later than the morning of Wednesday, the 10th May, 1911. (*Note.*—The sale took place on 15th May, 1911.)

(*h*) Buyers and sellers will accept weights as certified by the Chamber of Commerce.

(*i*) The bales of each seller will be numbered consecutively, and each seller's complete lot of bales of each particular kind of tobacco will be put up for auction as one lot. The highest bidder to be the purchaser and to have the privilege of selecting any or all the bales in any one lot, but not less than one bale. The bales not selected by the highest bidder in any one lot will then be again put up and the same procedure followed until any one complete lot has been sold.

(*j*) Buyers must take the delivery of the tobacco purchased within forty-eight hours from the conclusion of the sale. After that period has expired a charge of 1d per bale per day will be made for storage. Such tobacco will be held only at the risk of the buyer, and no liability will be recognized either by the Chamber of Commerce or the auctioneer for depreciation in the value of the tobacco from whatever cause arising.

(*k*) All tobacco unsold must be removed by the owners within one week of the sale, otherwise storage at the rate of 1d. per bale per day will be made beyond that period. Such tobacco will be held entirely at the risk of the owners.

(*l*) All sales are for cash. Accounts must be paid promptly to the Treasurer of the Capetown Chamber of Commerce, whether the tobacco is removed or not. Interest at bank rate will be added to the accounts after three days have expired from the date of the rendering of the account.

Prospects.—It is hoped that this sale will continue to be an annual function and increase in popularity with successive years. It has already been pointed out that the industry has received and still requires careful nurturing, and the thanks of the country are due to Mr. Stella, the Government Tobacco Expert, whose untiring and self-sacrificing efforts under often adverse circumstances have done so much in placing tobacco growing in such an eminently satisfactory condition. If the demand from farmers for assistance during the coming season can be taken as an index, then there is no doubt that this year will see further progress made, a larger area under cultivation, and, it is trusted, increased prices for an improved article.

The Manuring of Vineyards.

Lectures delivered at the Paarl on the 16th and 31st May, 1911, by Dr. A. I. Perold, Government Viticulturist (Cape).

PART I.

In order to produce as economically as possible, every farmer should know exactly how much of the different fertilizers his soil requires for the crops which he grows on it, as it must be borne in mind that different crops require different nourishment from the soil. Manuring lands for wheat is not the same thing as manuring them for vines. In order to get at the exact formula of manuring for each case, one must investigate what quantity of each kind of plant-food is available for the plant in the soil, and how much of this plant-food is used yearly by each separate crop.

The chemical analysis of the soil gives an answer to the first of these questions. We must, however, always keep in mind that this answer never can be a decisive one. I say this because:—

(1) It is always very difficult to get a good sample of soil which truly represents the average composition of a relatively large piece of ground. Various kinds of soil may not be mixed together. The samples must be taken carefully, and there must be many of them.

(2) It is also very difficult to determine how much plant-food there is in the soil *available for the plant*.

Attempts have been made to get at the truth in this matter, as near as possible, by applying diluted solutions of ammonium citrate for a certain time to act on the soil to be analysed, but it is difficult and practically impossible to do this in the laboratory in the same manner as it is done on the soil in the open. The plant produces certain acid substances which, under certain weather conditions, act continually during a long period on the soil, and by so doing dissolve the plant-food and render it available for the plant. In the laboratory we do not work with the same acid substances as the plant produces, and we do not work under the same weather conditions as prevail in the open. Moreover, the experiment cannot be made to last so long as it does in the open air.

Therefore the results of a chemical analysis of the soil must be taken with caution. Sometimes it may be of great value if one knows how to make proper use of it. In any case an analysis must always be considered as a first advice in the selection of one or other formula for manuring. The correct answer can only be given by practical results, obtained after several years of experiment.

An answer to the second question, i.e. how much plant-food the crops take yearly out of the soil, can immediately be obtained by chemical analysis. It was in consequence of such analysis that Professor Von Liebig came to the conclusion that all soils will in time

get completely exhausted if the same quantity of mineral constituents which is taken from the soil by the crops is not restored.

I think, however, that this is viewing the matter from an exaggerated standpoint, because I cannot see—although the assertion in itself is quite correct—why plants should not be able to thrive, or at least partly thrive, on the nearly inexhaustible stock of certain kinds of plant-food in the soil. I therefore consider that a "soil exhausting cultivation", against which Professor Von Liebig so strenuously fights, is not always to be rejected, if it is not exaggerated.

By and under the supervision of Dr. Juritz much has already been done here in the analysis of soils; but up to the present we have not yet had a series of analyses—done systematically and on a great scale—of those constituents which our crops take out every year from our fields. This is, however, urgently needed, because this second investigation will serve to complete the first one and because without it we will be unable to get even a satisfactory formula for manuring.

That this applies more perhaps to the culture of the vine than to any other culture is proved by M. Müntz in his work "Les Vignes", Paris, 1895. Later I will confirm this view by reading extracts from this work.

It is to be hoped that such investigations will also be made as soon as possible in this country. We ought to know how much plant-food we yearly take out from our vineyards with our vines, because most of it is lost for the vineyard. It would also be well to know how much plant-food is contained in the leaves and how much in the shoots, as both are very often removed from the vineyard.

Such investigations should be made in different wine districts, with different kinds of vines, on different soils, and in poor as well as in rich vineyards.

Before I begin to lecture on my subject I wish to draw your attention to certain matters of general interest concerning manuring.

(*a*) *Cultivation of the Vineyard.*—It is impossible to expect the full results of good manuring if the vineyard has not been well cultivated. The soil should be kept well loosened, and where necessary should be well drained in order that any surplus water may be removed speedily. Special care should be taken that no grass grows in the vineyard. If this is done during several consecutive years there will be little difficulty with grass in the future. Sorrel on heavy clay soils forms an exception, and is useful.

(*b*) *Time for Manuring.*—Here the nature of the manures which are to be used must be taken into account. For instance kraal and stable manure can be applied rather early in the season. The same can be said of basic slag, bone meal, kainit, etc. Guano, however, may only be applied in July, and nitrate of soda not before August, while sulphate of ammonia can be applied earlier.

(*c*) *Manner of Manuring.*—Amongst our wine farmers it is the custom to make deep holes between every four vines, or deep furrows between the rows of vines, and then to bury the manure in these holes or furrows. I cannot agree with this manner of manuring. The aim must always be to make the plant develop its roots in every direction in the soil. It is then able to feed evenly over the soil and take the necessary moisture out of it. I therefore strongly recommend the spreading of the manure evenly over the soil, and then to plough or

dig it under. Guano, and such manures as are used in small quantities, can be sown over the soil.

(*d*) *Economic Value of Manuring.*—Very often this point is completely lost sight of. Some farmers admit openly that they give no manure at all to their vineyards, or at least very little. Their crops are then generally small. If asked why they do not manure, they simply answer you that they have no money to buy fertilizers. This may be so, but the principal reason is that they do not know the great value of proper manuring. Otherwise they would not sit still, but do all in their power to get fertilizers. The necessary money could even be borrowed. They will then find out that with correct manuring their vineyards will improve in growth as well as in returns. Every pound sensibly spent on manuring will give two, three, and more pounds in return.

Many farmers have too large vineyards; 50,000 vines, well looked after and thus well manured, will give a greater yearly profit than 100,000 vines which have been badly cared for and have had little or no manure. The ploughing, pruning, etc., of a vineyard remain the same whether the vineyard produces one or four leaguers per 1000 vines, but in the latter case four times as much money is obtained for the product as in the first case. Now, you might say, that with such a large production the wine will be of inferior quality. *That is not at all necessary.* Professor Zacharewicz, in France, and others have proved that a larger production does not necessarily involve an inferior quality. This, of course, applies only as long as reasonable limits are observed.

It should be borne in mind that by continuously applying more manure the production cannot be increased *ad infinitum.* Later on the increased production is no more in a favourable proportion to the increased cost of manuring. Therefore certain manure formulae must be used which have been found out by practice, and which can be altered if necessary according to circumstances. But in choosing between two or more formulae which perhaps are all suitable for the soil, one must also keep in view the cost of manuring per morgen of vineyard.

In connection herewith it must not be forgotten that the cheapest fertilizers (always taking into consideration their feeding value for the vine) are those which are produced on your own farm. Next come the fertilizers which are produced in our own country—thus, our Government guanos, Karoo sheep manure, or Karroo ash, and only then come the artificial manures (which are mostly imported, and are therefore much more expensive than our local manures). Later, in discussing manuring formulae, we shall see that local (guano and Karroo) manures, containing the same amount of plant-food, are two to three times cheaper than the artificial manures. The latter are no doubt very useful, but they cannot compete against guano and Karroo manure as regards price.

For instance, the price of a ton of guano is £6 and of a ton of nitrate of soda about £14. 10s. However, the former contains not only nearly as much nitrogen as the latter, but contains also 40 lb. potash and 220 lb. phosphoric acid, the value of which is respectively 14s. 6d. and 63s., or a total value of £3. 17s. 6d. Therefore one pays in both cases for the same amount of nitrogen (guano contains one-

fifth less nitrogen than nitrate of soda) £2. 2s. 6d. and £13. 10s. respectively. It can therefore be clearly seen that *the unit of nitrogen in nitrate of soda is six times more expensive than that in Government guano.*

Good manuring is the most economical way of manuring. An important point is:—

(*e*) *To give always a Complete Manuring.*—It would be unprofitable to manure only partly where a complete manuring is necessary. In order to explain this I cannot do better than to give the following example:—A heavy object has to be transported, and ten men can do this *together*, but instead of the ten men laying hold of it *all at the same time* five try it first, and then again the five others, with the result that they are unable to move the object. So the task remains undone. In the same way every plant must get enough of the different constituents in order to give the highest return. If the soil is deficient in certain constituents, or if they are present in very small quantities, these constituents must be included in the manuring formula.

A soil will be deficient in the first instance in three constituents. These are nitrogen, potash, and phosphoric acid. Therefore every manuring formula must be based principally on these constituents. In soils which contain a great proportion of one of these constituents the latter can be left out from the formula during several years, but even in this case one must try whether the addition of this constituent will not prove advantageous, as one special plant might use more of this substance than another.

Generally speaking it can be safely asserted (and the experiments of Professor Zacharewicz have conclusively proved it) *that a complete manuring formula is the best.*

It will only be necessary to alter slightly the proportion of the different constituents according to circumstances.

Before discussing certain definite manuring formulae I wish to point out the most important results of the latest investigations.

Let us start with the work of M. Müntz, "Les Vignes", which we have mentioned before. During a series of years he made careful analyses of typical soils from all the French wine districts, as well as of grapes, wines, shoots, leaves—each separately. In this manner he determined how much plant-food was removed from the soil in each instance. On page 447 of his book he says, speaking of the vineyards of Southern France (Midi):—"If one compares the vineyards in the south, where the crop is in some cases twice as large as elsewhere, one finds that in several cases different quantities of plant-food are absorbed. These differences, however, seem to stand more in proportion to the production of leaves and shoots than to the crops. Indeed, the leaves contain the largest quantity of plant-food. . . . In Caudillargues a vineyard with a return of 14.8 leaguers per morgen has absorbed 117½ lb. nitrogen, while a vineyard at Labrousse, with a return of 20.7 leaguers per morgen, absorbed only 95 lb. nitrogen. But the former had produced 4440 lb. of dry leaves, which alone had absorbed 95 lb. of nitrogen, while in the latter case only 3080 leaves absorbed 57 lb.

"*The great requirements by certain vineyards in the way of fertilizers are thus dependent on their large production of leaves and shoots, or, in other words, on their rank growth and not on their crops.*

"This appears from the following average figures, calculated for the whole of France (per morgen):—

	Whole vineyard absorbs:	Leaves absorb:	Shoots absorb:	Produced wine contains:
Nitrogen	86 lb.	55 lb.	13 lb.	2 lb.
Phosphoric Acid ...	19 lb.	9½ lb.	3·7 lb.	.2 lb.
Potash	94 lb.	48 lb.	22 lb.	5½ lb.

"Experiments made with different kind of grapes have proved that the variety has little influence on the quantity of plant-food which is taken from the soil. The rankness or thinness of growth of the vineyard always remain the principal factors here."

On pages 451-453 he gives his "Practical Views on Vineyard Manuring":—

"In comparing the different kinds of plant-food taken from the soil by the vine, it clearly appears that in the south the quantity of nitrogen is much larger than the quantity of potash, notwithstanding the high production of wine, in which the potash concentrates itself. . . . In the south the vineyards principally exhaust nitrogen from the soil, and further north principally potash. Farmers in the south must take this fact into consideration and give their vineyards a good nitrogen manuring. . . .

"It seems that in the Medoc and Champagne Districts a greater quantity of phosphoric acid is absorbed than in the south. The quantity, however, is never large, and one could infer that a phosphoric acid manuring is unnecessary. Some practical wine farmers, however, seem to have observed that the grapes blossom and mature better when they have been well manured with phosphates. In any case it will be well not to reduce the phosphatic manuring before it has been clearly shown by practice that it is not necessary to add to the soil more phosphoric acid than the plant takes from it. Potash, of which the vine absorbs much, is generally present in the soil in great quantities, especially in clay soils. Generally speaking I think that potash manuring is of little use. It is only to be recommended for light, sandy soils and soils which are rich in lime. Further, it must be borne in mind that more potash than nitrogen is added to the soil with a natural manure such as kraal or stable manure. Only in the case of manuring with nitrate of soda, sulphate of ammonia, ground horns, dried blood, etc., which contain scarcely any potash, a special potash manuring with commercial alkaline salts is to be recommended for those soils which are deficient in potash."

On page 457 Müntz says:—"If you calculate for the different vineyards the quantities of plant-food which are necessary to produce one leaguer of wine you will find that in the Medoc and northern districts, where such excellent wines are made, much more plant-food is required than in the south, where generally ordinary wines are made."

Page 481:—"In the south-west (Medoc, etc.), where wines of such excellent quality are made, great quantities of phosphoric acid are used, casually or intentionally, in manuring (perhaps in order to keep the quality of the wine so high). In addition to stable manure, also oilcake, refuse, etc., are given, which work slowly. In Burgundy

stable manure, with phosphates, is mostly used. At Gevrey-Chambertin, where the best Burgundy wines are made, the following quantities of plant-food per morgen are used in manuring:—

	Nitrogen.	Phosphoric Acid.	Potash.
Applied to the soil	101 lb.	304 lb.	101 lb.
Taken from the soil by the vines	55 lb.	17 lb.	63 lb.

"The phosphoric acid manuring is very high."

On pages 485-486, Müntz says:—"Contrary to the general opinion it must be stated that profuse manuring of a vineyard, at least with natural fertilizers, has no detrimental effect on the quality of the wine. For it is in the Medoc and Champagne Districts, which are so famous for the high quality of their wines, that great quantities of manure are applied."

"*Conclusion.*—As a practical conclusion of these numerous investigations we can take it for granted that it is more the economic situation of the vineyard than its requirements which must decide the use of fertilizers.

"In vineyards which produce very expensive wines profuse manuring is of great importance, as a small increase in crop is already sufficient in such a case to compensate the additional cost. Such vineyards, however, which produce much wine of ordinary quality must get no more manure than is strictly necessary, as it is quite possible that the additional cost for the manure will not be covered by a larger crop. . . . It is important to use in these vineyards only such fertilizers *as act quickly*, and the effect of which can be perceived in the same year. In the south preference must be given to those fertilizers which are rich in nitrogen."

So far M. Müntz.

Let us now have some extracts from the pamphlet of Professor Zacharewicz, "Expériences sur les Engrais, appliqués à la Culture de la Vigne". On page 114 of this work we read as follows:—

"*Nitrogen.*—For the diluvium of the Alps, nitrate of soda (Chili saltpetre) is the best nitrogen fertilizer. These soils dry up quickly, and therefore the roots can soon get their nitrogen in the form of nitrate. In other soils ammonium sulphate is a good substitute.

"*Potash.*—Carbonate of potash produces the largest crops, but sulphate of potash is more profitable (it is cheaper than the carbonate) and it increases the sugar percentage.

"*Phosphoric Acid.*—Superphosphate has a visibly good effect on the crop and the shoots mature better.

"*Plaster of Paris* can always be applied on account of its favourable effect on the soil.

"*Composition of Manures.*—Generally speaking a complete fertilizer is the best.

"Nitrate may not be mixed too long beforehand with superphosphate, as this will cause a loss in nitrogen.

"*Time of Manuring.*—Sulphate of potash and calcium superphosphate are pulverized, thoroughly mixed together, and then spread over the vineyard and ploughed under immediately. (Professor Zacharewicz has also proved experimentally that it is better to *spread the manure evenly over the soil*, thus not burying it in holes or furrows.) This is done about the end of April. Nitrate of soda and plaster of paris are ploughed under together early in August.

"*Sugar.*—It is of great importance for the wine farmer that while chemical fertilizers increase the crop they do not decrease the sugar percentage in mature grapes."

The above results were obtained by Professor Zacharewicz after twenty years' experiments with manuring of vineyards. They are therefore reliable. Here, however, the high prices of these fertilizers, compared with guano and stable manure, are an obstacle to their use (at least for most of the chemical fertilizers).

An excellent work on vineyard manuring is "Les Engrais de la Vigne", by Michaut and Vermorel, Third Edition, 1905. It is a pity that so few here understand French. I will, however, quote some extracts from this work. We find on page 106:—

"If we apply on an average 83 lb. nitrogen, 27.6 lb. phosphoric acid, and 92 lb. potash per morgen, then our vineyard will be in a favourable condition to convert the raw substances into grapes (wine). This opinion is now generally considered as correct."

On page 114:—"Experiments made on different farms have proved that in lime soils potash gives the best results. In soils more or less deficient in lime, phosphoric acid and potash together are the most profitable. We recall the words of M. Müntz, that nitrogen is the best fertilizer for vineyards with a large production in the south. According to Dr. Wagner, of Darmstadt, phosphoric acid insures a good quality (of the wine), a more regular production by preventing the berries from dropping off the bunches, makes the vineyard more resistant against disease, and, lastly, causes the grapes to be of a good standard and to ripen well."

Page 141:—"In 1902 Guillon and Gouirand, in discussing their five years' experiments with vineyard manuring on calcareous soils (25-30 per cent. lime) near Cognac, showed that potash had given the best results there. The curious part of the matter is that this soil was rather rich in potash. In this case the chemical analysis of the soil had been of no use for laying down a manuring formula."

Then they continue as follows:—"If, instead of trying to ascertain in what direction the soil is deficient, one were to determine how much plant-food is taken from the soil our results would be fully corroborated. Indeed, Müntz has already proved that, while the vineyards in the south use much nitrogen, they remove in the south-west, east, and north-east mostly potash from the soil."

Further, they come to the conclusion that (for their calcareous soils of course) the principal fertilizers are potash, then phosphoric acid, and lastly nitrogen. They also state that kraal and stable manure are excellent fertilizers. And, finally, they are of opinion that the chemical analysis of soils does not show sufficiently what kind of fertilizer must be used. Only systematic experiments, continued for several years, can procure the farmers the required information.

This was also proved by Prosper Gervais. On page 159 of his work he says:—"During all my experiments with vineyard manuring it struck me especially that potash seems to have but a small effect on the final result, whilst phosphoric acid has a predominant influence. Yet my soils are deficient in potash, and one would think that a potash fertilizer should be necessary in this case. They, however, are rich in phosphoric acid, or at least contain enough of it, and yet a phosphatic manuring has always given very good results."

These are the words of a person who can speak with authority on the subject. Not too great a value must therefore be attached to soil analysis, but careful attention must be given to the effect of the different fertilizers.

Let us have one last quotation. This time on the *effect of manuring on the quality of the wine.*

Professor Ravaz, the famous authority on viticulture of the Agricultural College at Montpellier, in his pamphlet, says on page 161:—"The strongest (largest) vines give the heaviest and best wine. The quality of the grapes not only depends on the activity of the leaves, but also on the reserve of plant-food which the plant has gathered in the preceding year. This explains why *old vineyards* with relatively few shoots, as compared with the enormous development of their roots underground, produce a *better wine* than young vineyards. Further, it proves that vines with a scarcity of shoots, or producing a great quantity of wine of inferior quality, will be able to produce a much better wine if less is required from them and if they are cut down shorter."

Therefore quality as well as quantity can be obtained from weak vineyards by proper and sufficient manuring.

As I intend discussing the principal fertilizers in detail I will do so at the end of my lecture, and speak now about the different

Vineyard Manuring Formulae.

At the Congress of Viticulture, held at Montpellier in 1893, the following formulae were mentioned:—

1st Period.—Vineyard produces less than 7 leaguers wine per morgen.

1st year per morgen—

9 tons stable or kraal manure, or its equivalent in organic fertilizers, f.i. linseed cakes.
And 920 lb. of the following—

Formula No. 1 { 400 lb. calcium superphosphate.
200 lb. sulphate of potash.
400 lb. plaster of paris.

2nd year per morgen—

1472 lb. of Formula No. 1.
184 lb. nitrate of soda.

3rd year per morgen—

1840 lb. of Formula No. 1.
276 lb. nitrate of soda.

2nd Period.—Vineyard produces 7 to 14½ leaguers wine per morgen.

1st year—

9 tons stable or kraal manure.
1104 lb. of Formula No. 1.
184 lb. nitrate of soda.

2nd year—

2208 lb. of Formula No. 1.
276 lb. nitrate of soda.

3rd year—

9 tons stable or kraal manure.
1288 lb. of Formula No. 1.
276 lb. nitrate of soda.

3rd Period.—Vineyard produces more than 14½ leaguers wine per morgen (i.e. 4 leaguers per 1000 vines of 5 by 5 feet).

1st year—

3½ tons sheep manure (fresh), not Karroo manure.
1104 lb. of—

Formula No. 2 { 400 lb. bone superphosphate (18 per cent.). 400 lb. plaster of paris. 200 lb. nitrate of potash.

2nd year—

3½ tons sheep manure (fresh).
1288 lb. of Formula No. 2.
460 lb. nitrate of potash.

3rd year—

3½ tons sheep manure (fresh).
1472 lb. of Formula No. 2.
552 lb. nitrate of potash.

4th year—

3½ tons sheep manure (fresh).
1840 lb. of Formula No. 2.
552 lb. nitrate of potash.

For the *calcareous soils* of the Cognac District, M. Guillon recommends the following:—

552 lb. nitrate of soda per morgen.
276 lb. sulphate of potash per morgen.
552 lb. calcium superphosphate per morgen.

Where chlorose is to be feared he recommends the addition of 552 to 920 lb. ferrous sulphate.

For sandy, clay soils (which after rain adhere to the shovels) he recommends:—

460 lb. sulphate of ammonia per morgen.
368 lb. sulphate of potash per morgen.
552 lb. calcium superphosphate per morgen.

In this case it would be well to replace nitrate of soda by ammonium sulphate, because the soil-water enters more easily the deeper layers of soil. Nitrate of soda would be too easily washed off by the rain.

These formulae have been prepared in France, but are too expensive for us.

I propose the following formulae for our wine farmers, all per morgen of vineyard:—

(1) 600 lb. Government guano.
160 lb. sulphate of potash (50 per cent.).
400 lb. basic slag, or 300 lb. bone meal.

(2) 600 lb. Government guano.
600 lb. fresh kraal ash.
280 lb. basic slag, or 210 lb. bone meal.

(3) 500 lb. Government guano.
1500 lb. Karroo sheep manure.
350 lb. basic slag, or 260 lb. bone meal.

(4) 9 tons stable manure.
560 lb. basic slag, or 420 lb. bone meal.

(5) 560 lb. nitrate of soda (15 per cent.).
180 lb. sulphate of potash (50 per cent.).
880 lb. basic slag, or 660 lb. bone meal.

The feeding value of each formulae is shown in the following table:—

Formula No.	Nitrogen.	Potash.	Phosphoric Acid.	Price.
1.	84 lb.	92 lb.	123 lb.	80s.
2.	84 lb.	87 lb.	126 lb.	54s. 6d.
3.	91 lb.	86 lb.	126 lb.	53s. 6d.
4.	(about) 90 lb.	(about) 95 lb.	(about) 127 lb.	(about) 52s. 6d.
5.	84 lb.	90 lb.	126 lb.	148s.

NOTE No. 1.—As will be seen, the quantities of nitrogen, potash, and phosphoric acid in the different formulae are nearly the same.

NOTE No. 2.—There is, however, a great difference in price. These are calculated on the following basis, but must be considered as liable to variation:—

Government guano	£6	0	0	per ton.
Fresh Karoo ash, for an 8-ton wagon £10 or ...	1	5	0	"
Stable manure, for a 6-ton wagon £1 or ...	0	3	4	"
Karoo sheep manure, for an 8-ton wagon £5 or	0	12	6	"
Sulphate of potash (50 per cent.)	18	0	0	"
Nitrate of soda (15 per cent.)	14	10	0	"
Basic slag (14·3 per cent.)	4	0	0	"

If the prices of the five formulae (i.e. of the quantities of fertilizers mentioned in each) are compared with each other, it will immediately be seen that the chemical fertilizers (Formula No. 5) are nearly *three times as expensive* as the natural fertilizers (Formulae Nos. 2, 3, 4, of which only basic slag is a chemical fertilizer).

NOTE No. 3.—I have included large quantities of basic slag in my formulae because (*a*) in addition to 14.3 per cent. phosphoric acid, it contains 40 per cent. lime (very active); (*b*) as we have seen already, phosphoric acid improves the quality of the wine.

NOTE No. 4.—Time of manuring:—

Formula No. 1.—Basic slag and sulphate of potash together in April-May; guano in July.

Formula No. 2.—Basic slag and kraal ash together in April-May; guano in July.

Formula No. 3.—Basic slag in April-May; Karroo sheep manure, May-June; guano in July, or the two last-named together in June.

Formula No. 4.—Basic slag in April-May; stable manure in May-June.

Formula No. 5.—Basic slag and sulphate of potash together in April-May; nitrate of soda beginning of August.

NOTE No. 5.—Basic slag, lime, kraal ash, or other ash may never be mixed with manure (stable, kraal, Karroo sheep), sulphate of ammonia, or guano, as this would cause the ammonia to evaporate, which would result in a great loss of nitrogen.

NOTE No. 6.—These formulae can be changed somewhat according to circumstances. The quantities given of the different fertilizers for one morgen of vineyard can be increased or decreased in the given proportions according to the fertility of the soil and the vineyard.

Milk Records.

Tweespruit Experimental Farm (May, 1911).

Breed and Name of Cow.	Date of Last Calving.	Lb. Milk.	Fat Test.
Frieslands.	1910.		%
Rinske III.	16th September	189	4·6
Nora	20th October	641	3·8
Gertje	13th November	609	3·7
Japke	1st June	464	3·7
Dijkstra	18th November	552	4·6
Trijntje	13th December	597	3·8
	1911.		
Anna	11th January	615	3·0
Veeman	11th April	1232	2·8
Rinske IV.	7th May	900	2·8
Red Lincolns.	1910.		
Daphne	22nd December	531	3·8
Bracebridge	10th October	347	4·0

Grootvlei Experimental Farm (May, 1911).

Breed and Name of Cow.	Date of Last Calving.	Lb. Milk.	Fat Test.
South Devons.	1910.		%
Primrose	13th October	446	3·4
Opal	10th November	344	5·2
Merry Glass	19th November	457	4·1
	1911.		
Bertha	31st January	576	3·3
Sweetheart	18th March	616	4·1
Dauntless	1st May	775	4·0
Eva	3rd May	1217	3·3

Correspondence.

This section will be set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture will be particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria", and written on one side of the paper only.

SHEEP DIPPING IN HOT AND COLD WEATHER.

To the EDITOR of the *Agricultural Journal*.

SIR,—Please let us know what is the best, according to your opinion—to dip sheep on a warm day or on a cold day? Many of our farmers complain that scab broke out amongst their animals during winter, when it was too cold to dip. Others complain that they have no water for dipping. I think that a cold day is much better for dipping than a warm day with sunshine and wind. A sheep does not drink much water on a cold day, and one could use the drinking water for dipping purposes.

I also think that the following is the best manner of dipping to eradicate scab completely:—

On a cold day one can start dipping early in the morning, but if the sun is very hot, one must start dipping in the afternoon when the air cooled down, but the sheep must then not be allowed to graze too much in the morning, otherwise they will suffer from the dip. For sheep with horns, especially rams, it is of advantage to spray the horns with paraffine before they are dipped.

When the sheep have been dipped, keep them for twelve or twenty four hours in a sheltered or warm kraal, and let them stand as close together as possible, in order to keep the wool moist, and no scab-louse will remain alive. But if one lets the sheep dry in the sun and wind immediately after dipping, some half dead lice might recover.

The sheep, which have been dipped and dried in cold weather and have fasted for a certain time, will start growing immediately, while those which have been dipped in the warm sun and dried will not grow for ten days.

When the sheep are completely clean, make an agreement with your herdboy that you will pay him 5s. for the first sign of scab he may discover. But if you see the first sign of scab before the herdboy notices it, then the latter must pay 5s.

Enter into the same agreement with the shearers, but for a smaller amount, say 6d. or 1s. If a small spot of scab is discovered, let it be hand dressed at once with dip. Spots about which you are in doubt should also be hand dressed.

This is not only the cheapest way to eradicate scab, but your labourers are also interested and do their work carefully and with pleasure.—Yours, etc.,

Rodekleigat, P.O. Malmesbury. N. A. BLANKENBERG.

Our correspondent is referred to the article on Scab Eradication in the last issue.—Editor, *Agricultural Journal*.

THE SECRETARY BIRD.

To the EDITOR of the *Agricultural Journal*.

SIR,—Referring to Mr. Devitt's letter in your May issue on the secretary bird and game protection, in which he reports having seen a secretary bird running away with a hen in its beak, it may interest him to know that some time ago, I shot a secretary bird on this farm, and examined the contents of its stomach. The first thing to appear was a young hare, which the bird had evidently swallowed shortly before its death. Besides this the stomach only contained a number of lizards. I do not think that there can be any doubt as to the secretary birds killing and eating small game when opportunity offers, although his main diet may consist of reptiles.—Yours, etc.,

Harrietsberg, P.O. Mosita, B.B. L. WINSOR.

ROOI-BLOEM OR WITCHWEED.

To the EDITOR, *Agricultural Journal.*

SIR,—I think, as the witchweed is causing the loss of about two-thirds of the mealie crops in the Transvaal low veld, it is time that every farmer in that part should give his experience and let the Agricultural Department give one good man nothing to do but experiment on the pest and, with the help of the farmers, try and combat it, or else we had better give up mealie growing entirely.

My land is good heavy red soil, and would grow almost anything if it were not for this pest, which is ten times as bad as the mealie borer. When I took these lands over they had been abandoned eight years before on account of rooibosje, and I thought that it would be as good as virgin soil again. But, alas! it was not by a good deal. The first year there were no mealies, second a few, and third, full and no crop. But half of the land I ploughed in June, second year, and again in October, and put in beans; after I reaped them in February I ploughed it over and it lay fallow all the winter. In October I ploughed it over again and planted it with mealies once more. They grew splendidly—right above my head—but in January they began to get yellow, and I did not get a third of a crop. On some of the land I put soy beans in the rows between the mealies, with no better result.

I have not tried spraying with copper sulphate, but I don't see what good it will be unless it kills the seed, as it is like locking the stable door when the horse is gone. I shall be glad to see how Mr. C. Weir gets on at Koedoespoort. As far as cultivating or hand hoeing goes, the oldest farmers about here say that the more you hoe it the better it grows. It seems to come out all over the ground, so I do not see how you are to pull it out to destroy it.—Yours, etc.,

Oliphants River Station C. B. CUMMING.

BEE-KEEPERS' ASSOCIATIONS AND EXAMINATIONS.

To the EDITOR of the *Agricultural Journal.*

SIR,—With reference to the above, introduced by "Ichneumon" in the last issue of *Journal*, the following particulars may be of interest to your correspondent and any others seeking similar information.

There are now three Bee-Keepers' Associations in South Africa, viz. The South African Bee-Keepers' Association, Natal Bee-Keepers' Association, and the Pretoria District Bee-Keepers' Association; the hon. secretaries of which are respectively: Mr. A. J. Chesterfield, P.O. Box 3653, Johannesburg; Mr. W. F. Fuller, c/o Messrs. F. Shippey & Co., Maritzburg; and Mr. R. Sharp, "The Vinery", Wonderboom, Pretoria. The local Hon. Secretary for the South African Bee-Keepers' Association at the Cape is Mr. L. L. Hardwick, Bellville.

With regard to examiners for the British Bee-Keepers' Association certificate, Mr. H. L. Attridge, well known to the South African bee world, and Miss Dagmar Sillar of the Agricultural Department, Bloemfontein, were appointed examiners by the British Bee-Keepers' Association in 1909, and Mrs. Stuart Russel, of Silverton, Pretoria, has recently been added to their number. These are the only persons in South Africa at present authorized to conduct examinations on behalf of the British Bee-Keepers' Association.

Eleven candidates have been examined up to the present time, and a full list of passes will be issued shortly. It is proposed to hold examinations at different centres, particulars of which may be obtained from any of the hon. secretaries above mentioned.—Yours, etc.,

Pretoria. APIARIST.

To the EDITOR of the *Agricultural Journal.*

SIR,—My attention has been drawn to a letter signed "Ichneumon", appearing in the May issue of the *Agricultural Journal*, and I shall esteem it a favour if you will grant me the privilege of replying to it.

I am extremely pleased to make the acquaintance of "Ichneumon", even though the medium be by correspondence, for his aim and interest are identical with my Association's, and I feel that this bond will ripen into closer relationship.

My Association, to which I refer, is the South African Bee-Keepers' Association—national in character and formed with the object of disseminating knowledge, exchanging ideas, banding together all bee-keepers in a common cause, raising apiculture in South Africa to that level reached in other, but in many ways less favoured, countries, disposing of members' honey, and making bee culture, not a hobby of the few, but an asset of national wealth. The headquarters of the South African Bee-Keepers' Association are in Johannesburg, and the Association has a membership roll numbering more than one hundred active members, resident in every part of the South African Union, and in Bechuanaland and Rhodesia.

"Ichneumon" appears to have been misled as to the importance of the association mentioned and their examinations. The Pretoria and District Bee-Keepers' Association is a purely local one, and the truth about the examinations which took place is that they were arranged privately by the two candidates, and I am, I believe, safe in saying that the examination was conducted so quietly that, until it had taken place, the Pretoria Association as an association, had no knowledge of it.

Your correspondent will be glad to know that my Association held an examination for the third-class expert's certificate under the auspices of the British Bee-Keepers' Association (with which we are affiliated), and for this examination we had eleven candidates, several coming from the Cape Province and Natal.

It is the intention of the South African Bee-Keepers' Association to hold examinations annually at different centres, say, Rosebank one year, Port Elizabeth the next, and so on. Medals, too, are being offered shortly for competition amongst members.

"Ichneumon" does not state in which part of the Cape Province he resides, so that I am unable to give him any "local details". We have a district secretary at Capetown and one at Port Elizabeth, and they would be glad of his help and co-operation in forwarding the Association's policy. My point is that it is not necessary to call upon any man—public or otherwise—at this time, as the course "Ichneumon" advises is not only established, but flourishing.

May I suggest that "Ichneumon" (and as many others as are interested) send 12s. 6d. to me, which will make him a member of the South African Bee-Keepers' Association for one year, and entitle him to our official organ for the same period. We shall be delighted to have such an interested bee-keeper as a member and, once on our books, we guarantee to give him all he can do in the recruiting department.

Thanking you in anticipation for publishing this reply, and apologizing for its length.—Yours, etc.,

P.O. Box 3653, Johannesburg.

A. J. CHESTERFIELD,
Hon. Secretary, S.A. Bee-Keepers' Association.

POULTRY BREEDS FOR LAYING.

To the EDITOR of the *Agricultural Journal*.

SIR,—With reference to the above, the Transvaal Poultry Expert's reply, in the May issue of the *Journal* was that the best breeds for laying in both summer and winter are Wyandottes, Orpingtons, and Plymouth Rocks, as they lay better than the Leghorns during the cold weather. I have kept Leghorns [Australian (Padman's strain) and American strains] for several years, and have always found them splendid layers both during the winter and the summer months.

I shall try and prove what I say by giving a few results obtained in open competition in Australia. The Roseworthy 1910 and 1911 egg-laying competition in South Australia has just been concluded. The test at Roseworthy was divided into two sections, as follows:—

(1) Light breeds.—Fifty-eight pens of White Leghorns, one of Black Minorcas, and two of Brown Leghorns.

(2) Heavy breeds.—Fourteen pens of Black Orpingtons, eight of Silver Wyandottes, four of Langshans, and two of Black Orpingtons.

Each pen consists of two birds.

The following shows the position of the various breeds at the end of the test, and the average of each bird competing:—

No. of Birds.	Breeds.	Total.	Average per pen.
348	White Leghorns	71,434	205·27
84	Black Orpington	14,736	175·41
12	Brown Leghorn	2,033	171·91
48	Silver Wyandottes	8,086	168·45
6	Black Minorcas	1,087	161·16
12	Buff Orpingtons	1,884	157
24	Langshan	3,433	143·04

At the Galton College competitions, also just concluded, the first and second pens were White Leghorns, the first pen laying 1520 eggs, and the second pen 1433 eggs.

In the Queensland competitions 1906–07, the White Leghorns hold the world's record, the winning pen laying 1538 eggs; and in 1910–11 White Leghorns won with 1520 eggs. In New Zealand, where the winter is severe, the White Leghorns won at Nelson and Cambridge during 1909–10 with 1208 and 1289 respectively.

I could give several more results obtained by White Leghorns in open competition, but I think the above ought to be enough to show whether they are not both summer and winter layers. Most of the above pens were bred by Mrs. Padman.

The feeding is as follows:—At seven in the morning a hot mash was given in winter and cold in summer, consisting of one part bran and two parts pollard, and one and one-third lucerne chaff (soaked over night), with meat meal soup or water; green food at midday, and at night wheat and oats or maize, the latter being fed in cold weather. In the last two competitions held at Rosebank the White Leghorns swept the board.—Yours, etc.,

Eendragt, Rondebosch, C.P. C. H. VAN BREDA.

HANDLING OF HORSES.

To the EDITOR of the *Agricultural Journal.*

SIR,—I noticed in a recent number of the *Agricultural Journal*, and also in an issue of the *Transvaal Agricultural Journal* early last year, some directions and illustrations of how to handle and manage horses, many of which were worthy of the sixteenth century. I am a great lover of horses and have worked with them for over fifty years, but never with such success as during the last twenty years—since I had a copy of Galvagnes' book. I can safely say that I have mastered every horse I touched—and there have been some queer customers amongst them—and without any ill-treatment, but patience required.

For ordinary work all you require of the list sent you is the book, surcingle, head collar, Galvagne strap, hair rope, and leg straps; I often manage without any of these when they are not at hand.

My book was bought in 1888, and I daresay the present edition has a good deal more in it. I can safely recommend you to send for a copy.—Yours, etc.,

Simonstown, 1st June. A. BLACKBURN.

THE DIVINING ROD PROBLEM.

To the EDITOR of the *Agricultural Journal.*

SIR,—In the May number of the *Agricultural Journal* you publish a supposed explanation of the divining rod problem, by Prof. Dr. Gustav Jager and Prof. Dr. Karl Endriz, wherein they have both come to the same conclusion, namely, that the phenomenon of the divining rod represents in the first place a biological process, in which the organ of smell is the essential agent.

I must beg to differ from these two great scientists regarding the explanation of the problem. I have now been experimenting with the divining rod for the last ten years, and base my knowledge on practical experience; I claim that the divining rod has nothing whatever to do with the organ of smell, and since reading your article, I have again put it to different tests, such as closing the nostrils while working, drawing in the breath, inhaling strong scents, etc., and cannot say it has any effect whatever on the working of the rod.

So far as is known, divining rods have been used in this country mostly for locating underground waters. It is generally claimed that the divining rod only works with certain individuals. The people who claim this are totally wrong in their theory. I claim to-day that every human being in this world has the power in him or her to work it, if he only uses it the right way, and steadily over and over again, and have convinced the most sceptical that it is so, by getting it to work with them, and with whom it would never work before. With some it takes several weeks before they feel the slightest movement of the rod.

After experimenting for years with the divining rod, I have come to one conclusion with regard to its working, namely, that the power which draws it down is nothing else but magnetism—just as the needle is drawn towards a magnet, so the divining rod is drawn downwards towards the water. The man who holds the divining rod in his hands is charged with this—call it human magnetism, which is a power within him that can be cultivated and strengthened by constant practice and use of the rod; and the power below, or attraction, which causes the rod to dip down, is not the water itself, but the magnetic power in the veins which surround the water, and which the water strata or rocks contain; therefore a man finds when looking for water, that as long as he is on the water vein, the divining rod will dip downwards, but as soon as he goes over it, for 10 or 15 yards the rod will keep working backwards, showing him clearly that the water, and therefore the magnetic attraction, is now behind him. I have seen scores of men who could not hold a divining rod fast on some broad water veins; it jerks the rod down almost to their feet, and they find they have to throw it away. Why is this? Simply because such individuals are more charged with this magnetic power than others, and when coming upon a broad water vein which is highly charged with more magnetic rock—a broader stratum—they find it is too strong for them. I can invariably tell in which direction the nearest water runs, by holding the divining rod above my head with both hands. The rod will draw or dip towards the nearest water, even if it be 50 yards away, so where does the power of smell come in here? I may add that it works equally as well in the cart or in the train.—Yours, etc.,

Vierkant, Brandfort. R. E. GOODALE OERTEL.

SWISS MILCH GOATS.

To the EDITOR of the *Agricultural Journal.*

SIR,—I notice an article in the May number of the *Journal* on Swiss milch goats, in which you wonder as to the fate of the progeny of certain Saanen goats imported in 1908.

Some years ago I bought three ewes from the stock of Mr. Bowker, being half Swiss and half Boer goats. I picked one as a milk goat and she gave me, without special feeding, 3½ bottles per diem. I crossed them again with Boer goats, as I could not find a Swiss ram, and I found they bred very true to type, the lambs in all instances growing a good deal quicker than the Boer variety. I sold several of the progeny for milk goats, and the Swiss characteristics continued to be perpetuated. At present I have lent one of the original three to a neighbouring farmer. She kidded about a fortnight ago. He informs me that she gives about two bottles of milk per diem.

I have found them no more subject to disease than the Boer goat, and though their condition does not look as good, they always keep in good health, even when subject to no special attention.—Yours, etc.,

Lawley Store, P.O. Lawley Station. C. BELL.

REMEDIES FOR SELF-SUCKING COWS.

To the EDITOR of the *Agricultural Journal.*

SIR,—*Re* the self-sucking cow of Mr. Rawlinson, of Boksburg. There is still another way which I notice has not been tried by Mr. Rawlinson, namely, to put an ordinary halter on the cow, also a strap over the body of the cow strapped well just behind the shoulders so as not to interfere with the walking, then to take a good sound piece of wood, say 2 inches square, or a light iron rod, about, say, from 2 feet 8 inches to 3 feet long (depends on cow), fix one end to the halter with a piece of rope with 10 inches or 12 inches play, pass the other end between the front legs of the cow, and fix to the strap round the body of the cow. I think this should fix her. Should Mr. Rawlinson try this plan, I should like to know the result.—Yours, etc.,

Florence, P.O. Bethulie. R. H. WAUGH.

To the EDITOR of the *Agricultural Journal.*

SIR,—In the pages headed "Questions and Answers", I note a question from Mr. R. G. Rawlinson, of Boksburg. I am not sure where I saw it, but he must try the following for his self-sucking cow: a girth and a halter with a strong stick tied to the halter passing in between the two front legs, tied to the girth.—Yours, etc.,

Villieria, Dist. Aberdeen, C.P. W. C. HOFFMAN.

EXTERMINATION OF JACKALS, ETC.

To the EDITOR of the *Agricultural Journal.*

SIR,—It was with extreme pleasure that I read the article by Mr. J. P. de Wet, of Boshof, in the *Farmers' Weekly*, on the above subject. Will you allow me, through the medium of your paper, as one who has also had some experience, to voice my feelings, and to say something in aid and support of that gentleman's views. I am exceedingly glad that some of our farmers are beginning to see the necessity for exterminating the jackal and rooicat, etc., which causes so much havoc and destruction generally. In our parts the jackal reigns supreme, and if every farmer were to keep a strict count of what he loses during the year through jackals, etc., one would stand amazed. I can safely say that our district lost more through jackals than through the late drought which we have just had. The drought fortunately has broken up, but the jackal goes on for ever. It is, in fact, the biggest pest with which we have to contend. It is not only that they are destructive to our animals, but they are also in a very great measure responsible for scab, and responsible for the majority of sluits which are devastating our country. They are also indirectly responsible for very large sums of money being taken out of our country annually. Why is it that men like Mr. Francis Bayly and many other progressive farmers are put to such, I may almost say, unnecessary and enormous expense, by putting up jackal-proof fences, which in many ways do not answer the purpose, for where the jackal fails to get through, the aardvark, or antbear, helps him. I say the best jackal-proof fence we can erect is to make it proof, by and through the death of the jackal. If we have not jackals, we can erect a fence of from seven to eight wires, and let our stock run free, instead of putting up from fourteen to fifteen wires, which would considerably reduce the cost of wire, etc. I also hold that scab and the jackal are twin sisters, and it is as necessary to wage war upon the one as upon the other, and until we have got rid of both, we can never hope, and never will make a success of sheep farming in this country. Now, seeing that this pest is so detrimental to our flocks, our wool industry, our veld, and to the revenue of the country, why—yes, indeed, why?—

should this sort of thing continue when it lies in our power to get rid of them? Let us combine, let us join forces, which after all is not so difficult; but in this matter, as with scab, it is necessary to have legislation, for where the progressive man does all in his power to eradicate scab, the negligent and indifferent man breeds it. I for one feel grateful to Mr. Maasdorp, the member for Graaff-Reinet, for having brought this matter forward in the Assembly, and I trust he will not rest until he has secured legislation on this point. I also trust he will find a warm supporter in the person of Mr. Louw, our member representing Colesberg. I also hope that this will catch the eye of our Minister of Agriculture; and I further hope and trust that some abler men will take this subject up and agitate until a law is passed to that effect. On one point, however, I differ from Mr. De Wet, and that is that Government should pay for the tails, as I am afraid this will cost too much money; but let the Government, by way of encouraging us, offer, say, two or even three prizes to each district of, say, £10, £15, and £20 respectively to the three men who kill the largest number of vermin. Speaking to a neighbour of mine the other day on the above subject, he suggested a very workable and practical plan. Let it be made compulsory for every farmer to bring and to hand to the Magistrate at a certain date say, five jackal tails, which in all conscience is little enough, and the man who fails, let him be fined. Say, for arguments sake, there are in this district 100 farmers, this would mean death to 500 jackals, and I feel confident it would mean and spell 5000 or nearly that number of live sheep to that district. Let us continue this, say, for about five or six years, and I think by that time there will be very few jackals left, if any. We will not only reap the benefit by letting our stock run free, and shear more wool, but our veld will not become so tramped out, we shall have fewer sluits, and shall then be able to devote more of our time and attention to the damming up of said sluits, which is, and has been, neglected too long. In conclusion, I beg to thank Mr. De Wet for taking this matter up and in the forcible way in which he has expressed himself. I trust the majority of our farmers will see and feel the necessity of exterminating this pest, and once rid of the jackal, scab will by itself die a natural death, for in the majority of cases scab is due to the kraaling of sheep. Let us determine to fight this pest tooth and nail, and not only will the present generation profit and benefit by it, but how much easier are we not making things for our descendants. Let me again express the hope that this matter will not drop here, but that abler and better men will take it up and fight it to a finish.—Yours, etc.,

Vogelstruisfontein, Richmond, C.P., JOHN S. CONROY.
8th June, 1911.

DAIRYING IN AUSTRALIA.—THE MILKING MACHINE.

To the EDITOR of the *Agricultural Journal*.

SIR,—I may state that I have had some experience of dairying, and have recently returned from a trip to Australia, where I visited a number of up to-date dairy farms, and was much interested in the labour-saving appliances I saw there, notably steel silos, milking machines, and motor engines for driving all kinds of farm machinery. The Australian dairy farmer is a great believer in machinery that will reduce labour, and in the districts I visited, the milking machine was in very general use.

I might say the advantages of the milking machine were brought home to me in such a convincing manner that I made up my mind I would not start dairying without one. Perhaps it will interest your readers to know how I became a convert to machine milking. Well, at a dairy farm I was visiting outside Melbourne, 130 cows were milked twice daily by a hired family consisting of eight hands, who on making some unreasonable demand for higher wages and being refused, decided to leave, and gave a week's notice. Being just in the height of the milking season, it was impossible to hire other hands, so the farmer then and there determined to put in milking machines and do the work with his own son and two farm hands. Three machines to milk six cows at a time were promptly installed, and by the time the family's notice expired, the milking plant was put in operation, and the 130 cows were milked by the three men in one hour less time at each milking than it took the eight hands on the old system. Everything worked beautifully, and it was evident that the cows liked the machine method, as they stood perfectly quiet, without leg ropes, contentedly chewing their cuds throughout the milking operation. My farmer friend expressed himself as being practically independent of hired labour, because with the machines he and his son could, if needs be, tend to and do the whole of the milking themselves without any trouble or inconvenience.

In addition to the considerable saving in wages through three hands doing the work of eight, there was an increase in the milk yield, owing to the cows being fully two hours longer on the grass. The milk was much cleaner and purer, and above all, there was the freedom from anxiety and worry through fear of the hired hands going out on strike, which in Australia prior to the milking machines, I was given to understand, was a great bug-bear to dairying.—Yours, etc.,

Welverdiend, 20th June. H. WIGHTMAN.

Questions and Answers.

These pages will be devoted to questions, and an endeavour made to reply to all inquiries upon agricultural topics of general interest, or concerning any of the articles published from time to time in the *Journal*. In all cases replies will be posted to correspondents so soon as same have been procured.

Correspondents are requested to write on one side of the paper only. No manuscript will be returned.

All letters must be addressed to the Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria.

PROFITABLE DAIRYING.

H. Wightman, Welverdiend, writes:—I intend taking up dairy farming for a living, and wish to adopt the most profitable and most economical methods. What I should particularly like to know is: (1) The best breed of milking cows for the high veld. (2) What is reckoned a good average milk yield per head per annum? (3) What is considered a fair price the year round for milk supplied to a city vendor?

Answer.—The Dairy Division replied:—From the strain of the questions put by correspondent, it seems he does not intend making butter or cheese for commercial purposes when taking up dairy farming, but intends to confine his business to the disposal of fresh milk only; for these reasons the following reply is forwarded: (1) Friesland cows and cattle. These animals are noted for their productiveness in quantity, but the percentage of fat is not so high as that contained in the milk of the Jersey, Ayrshire, or Shorthorn race. (2) A good daily average milk yield per head is 25 to 30 lb. With proper care and treatment there is no reason why a higher average could not be maintained with Friesland cows. (3) A fairly good price all the year round for milk supplied to a city milk vendor should be 1s. to 1s. 6d. per gallon.

PRESERVING DATES.

Gerard Rood, Van Rhynsdorp, C.P., writes:—We have some few date palms here bearing in very great abundance; they become very nice to eat on the trees. But we cannot preserve them for very long after they have been picked. Will you kindly ask in your *Journal* if any one knows any plan of preserving them, and please to reply to it in the *Journal* again.

Answer.—The Government Horticulturist (Transvaal) replied:—The only method used, so far as I am aware, in the treatment of dates is ordinary sun-drying. I do not know of any paper or pamphlet on this subject.

TREATMENT OF FRUIT TREES.

G. P. Sheffield, Beaufort Farm, Johannesburg, writes:—I would esteem it a great favour if you would advise me as to the best thing to do to apple and pear trees that are non-bearing. I have an orchard here of about 750 trees, in which about 250 are apples and pears. These trees have been kept fairly well pruned, and are now about eight or nine years old, and have borne hardly any crop whatsoever, and in fact some trees do not even blossom. To all appearance they seem in good health, making vigorous growth each year. I tried a small experiment with a few by pruning them back in December last, which seems to have forced out a few fruit buds for next year, but not many. I have inquired from some of my neighbours and they advise cutting the tap roots. Do you recommend this operation?

Answer.—The Acting Government Horticulturist (Transvaal) replied:—I should not advise cutting the tap roots of these apple and pear trees. I should dig a trench round them about six feet from the tree, and cut all the roots in that circle, cutting down at least three feet in that trench. Probably the trees are growing too strong. I should also cease to prune, at any rate, for a year or so.

HAIR BALL IN CALVES.

M. R. Horn, Wooldridge, Parys, Orange Free State, writes :—I bought a cow and calf in April. The calf looked about three months old, but was really six months. It was small and unthrifty. Suspecting worms, I dosed it with Cooper's, but did not find any worms in the excreta. It pined away and died, and on making a post-mortem examination, I found three hair-balls in the stomach. The largest was about the size of a tennis ball, and the other two only slightly smaller, otherwise the organs appeared healthy. Would the hair-balls have been the cause of the unthriftiness and death of the calf? Is there any means of detecting them in an animal, and any way of getting them evacuated?

Answer.—The Veterinary Division (Bloemfontein) replied as under :—The hair-ba would cause the unthriftiness and would possibly cause death. There are no characteristic symptoms of the presence of hair-balls in the stomach—they would be those of indigestion. There is no method of getting them evacuated. If it were possible to discover the presence of hair-balls in the rumen, they could be removed by an operation. The presence of hair balls in calves is common. The cause may be removed by encouraging the calves to take the following lick : Bicarbonate of soda, 1 part : sulphur, 1 part ; common salt, 6 parts.

STRIGA LUTEA—WITCHWEED OR ROOIBLOEM.

Geo. W. Hunt, "Busby", Lake Chrissie, writes :—Over a year ago you published a letter of mine and your reply in the *Agricultural Journal*. Well, I did as you told me —grew beans—and cultivated well, and now there is really very little, if any—I have seen none—of *Striga lutea* (witchweed or rooibloem) in this six acres. In the other land, where it was *red* in places with the weed, I have ploughed three times and left fallow ever since, but I have noticed there is a little still in this land here and there.

Answer.—The Government Botanist (Transvaal) replied :—Your experiment with *Striga lutea* is similar to that of many other farmers who have written to us. In almost every case, however, farmers find that it reappears when mealies are sown on the same land.

RAPE FOR MILCH COWS.

A. Newmark, Boschkloof, P.O. Napier, C.P., writes :—In the April number of the *Agricultural Journal*, on page 407, under the heading of "Rape", it is stated in the last paragraph but one, that rape is very suitable for sheep, goats, cattle, etc., except "*cows giving milk*". Kindly inform me if this is correct. I have been growing rape for ewes with lamb and was also under the impression that it would be suitable for cows in milk. If it is suitable for ewes, why not also cows?

Answer.—The following reply was posted :—Rape is a good milk-producing food, but when fed in large quantities it imparts an undesirable flavour to the milk. Given in a limited amount after milking, say 15 lb. at a feed, there would not be much danger of this tainting the milk. Mangels furnish a more satisfactory food than rape for cows in milk.

FARMING ON SOUTH COAST, NATAL.

T. Parkyns, Pretoria, writes :—Could you kindly advise me on the following matters, viz. when is the season for planting on the South Coast of Natal? What would be the best crops to put in? The soil is virgin, and this is the first season it is being ploughed over. The situation is about twelve miles from Port Shepstone, and about two miles from the sea. I shall be pleased to receive this information as early as possible, if you will be so kind.

Answer.—The Director, Division of Agriculture (Natal), replied :—Correspondent does not state whether the land in question lies to the north or south of Port Shepstone, and this point would materially affect a selection of crops. In the former case, he would have easy access to the railway, and could profitably establish, with favourable labour conditions, a pure plantation system on the basis of sugar, fibre, oil, and possibly starch crops. On the other hand, for a holding lying twelve miles to the south of Port Shepstone and on the coast, a system of mixed farming would be recommended, for the present at any rate, embracing the cultivation of grain and feeding crops, and the management of dairy cattle, pigs, and poultry. Further information as to the character of soils, the lie of the land, whether sheltered or exposed, the possibility or otherwise of irrigation, the local incidence of frost, and the probable cost of clearing the ground of bush or timber, would facilitate a more exhaustive reply to the inquiry.

The best relative results with sugar-cane in local conditions have been obtained from fields planted in November. This operation is, however, often commenced earlier and carried on until February. Cane planted after the latter month makes little development during the winter, and reaches maturity no earlier than that planted in the following spring.

Maize should not be planted before the middle of November, or later than the end of December. Early spring crops are subject to the attacks of the maize-borer, while late crops fail to mature properly.

Ground-nuts, which promise to be a very marketable oil crop, should be sown as soon as good spring rains have been experienced, as the crop bears direct relationship to the length of the growing period, the pods being progressively developed along the recumbent branches while the weather conditions remain favourable. Sweet potatoes may be planted at the same time with slips taken from a prepared seed-bed established in July or August.

Field beans, peas, and potatoes, in localities where no appreciable frost is to be feared, do better as autumn crops, and may be planted during March. An average rainfall on the south coast of some ten inches during the months from May to September inclusive, render possible good winter development of the above and such feeding crops as vetches, melilot, Japanese clover, and sainfoin. This system obviates a danger of sun-burning which not infrequently occurs in the younger stages of spring planted fields.

Cow-peas, soya beans, Florida beans, and velvet beans, however, with a tropical or sub-tropical habitat, should be planted, whether for grain, feeding, or a green manure crop, as early in the spring as possible, unless dry weather be experienced.

PRESERVING POTATOES.

G. A. van der Walt, P.O. Sannieshof, District Lichtenburg, Transvaal, asks:—What is the best method of keeping potatoes for a certain time? Must I leave them in the ground, or take them out and cover them with soil, or leave them lying loose, or in bags under cover? In other words, what is the best remedy against the potatoes becoming rotten?

Answer.—The General Manager, Experimental Farm, Potchefstroom, replied:—In the Lichtenburg District, I think the best method is to leave the potatoes during the winter in the ground in which they have grown, but care should be taken to see that they are covered over with a few inches of soil to protect them from frost, and from the caterpillar of the "tuber moth". To do this effectually, a fresh lot of soil should be turned on to the top of the rows of potatoes with a plough and, especially if the soil is loose and sandy, it might be better to dig up the potatoes at the beginning of winter and place them in a plough furrow. Then cover up with soil by ploughing back a furrow on either side. I do not recommend storing the potatoes in a pit and covering them over with grass or straw and soil; and they will keep "fresher" for market by leaving them in the ground than by storing them in a house.

LADYBIRD FOR AUSTRALIAN BUG.

E. Salzmann, Chubani, Thaba 'Nchu, writes:—Could you please let me know where I could get the ladybird for destroying the Australian Bug? They have killed two large orange trees, and all the others infected.

Answer.—The Assistant Biologist, Orange Free State, replied:—The Vedalia ladybird is now distributed throughout the Free State, and the Australian bug is kept down to such small numbers that it does not cause much damage. I do not think it likely, therefore, that the injury complained of by Mr. Salzmann is due to the bug, but probably to another scale insect or to some other cause. To collect a colony of ladybirds often means the expenditure of considerable time and trouble, and colonies are therefore not sent to any place, unless it is quite clear that the ladybird does not occur there.

CURING HAMS AND BACON.

S. O. Welsford, Canaan, Heilbron, Orange Free State, writes:—Would you kindly tell me what is the best method of curing hams and bacon, and how to prevent bacon from becoming rancid, and hams from becoming too dry in the summer months?

Answer.—The Dairying Division replied:—The fresh hams and bacon should be soaked in water to which a little salt has been added, for about three days, in order to remove blood and clean the meat before it is placed in the brine. The water should be changed each day.

A suitable brine may be made as follows :—

10 lb. Salt.
1 lb. Saltpetre.
1 lb. Sugar.
4 gallons Water.

This should be boiled until it becomes clear, any scum which collects on the top being skimmed off. Water should be added if necessary after boiling to make four gallons of brine.

When it is cold it is ready to receive the hams, etc. These should be kept in the brine for three weeks, then removed and dried.

Smoking may be done if desired. Rancid bacon is probably due to improper curing. Hams will not dry out so much if packed in bran.

WARTS ON CALVES' HEADS.

G. Dannhauser writes :—Will you be good enough to recommend to me a remedy against flat warts on the head of calves, and what is the best means to disinfect my stable? I will also be glad if you can give me a remedy against blue on the eye of a horse. I have a stallion which received a knock in his eye, and it is still blue.

Answer.—The Veterinary Division replied :—Probably the trouble with your calves is ringworms. Make an ointment of sulphur and lard, one part of the former to eight parts of the latter ; with a spoon, blunt knife, etc., scrape off the scales on the surface of the growths, then rub in some of the ointment once or twice a day for ten days or a fortnight. See that you thoroughly disinfect and wash your hands each time after dressing the calves or you may get ringworms yourself. To disinfect your stable, remove all manure, etc., then scrape the walls, mangers, woodwork, etc., to remove dirt and wash them thoroughly with water and Jeyes' Fluid—strength, twenty parts of water to one part of Jeyes' Fluid. Treat the floors in the same way. Then whitewash the walls and tar or paint the woodwork.

You may have difficulty in effecting a perfect cure of your horse's eye; the chances are that, as a result of the injury, a white spot will remain on it. You might try syringing the eye out twice a day with a nitrate of silver solution, strength five grains to the ounce of water. Get a chemist to make up a pint of the solution.

Notes on the Weather of April, 1911.

CAPE PROVINCE.

By CHARLES M. STEWART, B.Sc., Secretary to the Meteorological Commission.

MEAN pressure higher than the average; days and nights about 1° colder than usual, except in the West and South-west; a fairly high percentage of cloud with a moderate frequency of fog; slight frosts at the beginning and during the last fortnight of the month; an unusual number of westerly winds, but of less force than usual; an excess of rainfall over the Karoo and the eastern portions of the country, but a deficiency in the West and South; a number of thunder and hail storms greater than usual; such were the more prominent features of the weather of April, 1911.

Precipitation.—The mean rainfall, as shown by the records of 346 stations, amounted to 2·01 inches, falling on seven days, and being 0·03 inch or 1 per cent. above the average.

Division.	Mean Rainfall (1911).	Mean No. of Days.	Average Rainfall (1891–1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	1·84	6	2·94	7	— 1·10	— 37
South-west	0·80	3	2·18	5	— 1·38	— 63
West Coast	0·28	3	1·01	4	— 0·73	— 72
South Coast	1·75	8	2·28	6	— 0·53	— 23
Southern Karoo ...	0·69	4	1·23	3	— 0·54	— 44
West Central Karoo	1·90	6	0·88	3	+ 1·02	+ 116
East Central Karoo	2·12	8	1·14	4	+ 0·98	+ 86
Northern Karoo ...	2·14	7	1·48	4	+ 0·66	+ 45
Northern Border ...	1·25	6	1·60	4	— 0·35	— 22
South-east	3·32	10	2·37	6	+ 0·95	+ 35
North-east	2·80	9	1·94	6	+ 0·86	+ 46
Kaffraria	2·74	11	2·08	6	+ 0·66	+ 32
Basutoland	3·37	8	2·42	7	+ 0·95	+ 39
Durban (Natal) ...			2·89			
Bechuanaland ...	0·82	4	2·00	6	— 1·18	— 59
Rhodesia	0·51	3	1·43	4	— 0·92	— 65

Compared with the previous month there was a decrease of 1·66 inches, but the mean amount recorded this month was 1·21 inches above the corresponding quantity for April, 1910. The mean sectional rainfall was above the average in the East and over the Central Karoo, the surplus ranging from *plus* 116 per cent. over the West Central Karoo to 32 per cent. over Kaffraria. In the West and South, however, there was a deficiency of rainfall, amounting to 72 per cent. over the West Coast and 23 per cent. along the South Coast; a similar shortage in precipitation was met with over the Northern Border, Bechuanaland, and Rhodesia, where it varied between *minus* 22 per cent. over the first and 65 per cent. over the last mentioned areas. Compared with March last, there was a decrease in the amounts recorded over the different sections, with the exceptions of the Cape Peninsula, South-west and West Coast, whilst exactly the reverse is found to hold on instituting a comparison between this month and April of 1910, viz., the amounts recorded this year over the first three divisions were below the corresponding quantities for last year, but above them over the remaining parts of the country. Of the 346 stations, only 4 had *nil*, and 43 had 0·01–0·50 inch as the monthly totals; of the others, 44 had 0·51–1·00 inch; 81 had 1·01–2 inches; 108 had 2·01–3 inches; 46 had 3·01–4 inches; 8 had 4·01–5 inches; an equal number had 5·01–6 inches; while the 4 having over 6 inches were: Thaba N'dod, 6·02 inches; Hogsback and Port St. Johns, 6·17 inches each; and Evelyn Valley, 7·05 inches, the maximum for the month. From the following summary of 343 stations furnishing particulars of the daily quantities, it will be seen that the amounts recorded in 24 hours were nowhere excessive and was evidently of a soaking nature, calculated to benefit veld and lands; of 343 stations, 120 had *nil* to 0·50 inch;

156 had 0·51–1 inch; 64 had 1·01–2 inches; and only three (3) exceeded 2 inches in the 24 hours, viz., Middleton, 2·12 inches on 17th; Fort Cunynghame, 2·20 inches on 18th; and Lusikisiki, 2·25 inches on 10th. Except over the South-west and West, where partial drought has prevailed for several months, the veld is reported to be in good condition, and satisfaction is expressed at the general outlook for the winter. *Thunderstorms* were much more frequent and widespread than usual, and more numerous than during either the preceding month or the corresponding month of last year. In all, 586 such occurrences were reported on 29 days, but were most general from 16th to 18th, on 25th, and were less frequent on 5th and 30th. *Hail* was also more frequent than usual, being noted at 24 stations on ten days, chiefly the 16th. The only damage reported from this cause was caused by a storm at Vosburg on the 16th, when the hail lay to a depth of 2 inches, and caused damage to trees and gardens. No *snow* or *sleet* reported.

Temperature, Cloud, and Winds.—The mean temperature of all stations was 62°·2, or 4°·9 lower than in March, and 0°·8 below the mean for April, 1910. The mean of the day temperatures (73°·0) was 4°·5 lower than last month, and 1°·8 lower than during the corresponding month of last year; while the night temperatures were falling faster than the day, the mean (51°·3) being 5°·3 lower than in the preceding month but the same as during April of 1910. The mean daily range was 21°·7. Compared with the averages, the mean monthly temperatures were 1°·1 lower than usual, the mean maximum being 1°·4, and the mean minimum 0°·9, below the corresponding normal values. The majority of the stations in the west and south-west were commonly 1°·0 to 1°·5 warmer than usual, the exceptions being Port Nolloth and Bishopscourt (Cape Peninsula), which were 1°·8 and 0°·9 respectively cooler than the average. Over practically the remainder of the country temperatures were lower than the normals, mostly by 1–2° along the South and East Coasts and over the south-east division, the deficits increasing to over 2° over the greater part of the interior, but ranging from *minus* 0°·3 at Amalienstein to 4°·4 at Evelyn Valley and Hopefountain (Rhodesia). Two exceptional stations were Heidelberg and Kimberley, which were 1°·6 and 0°·4 warmer than the average. A parallel state of things prevailed in connection with the mean day temperatures. Thus, the mean maxima were 1–2° higher than usual over the west and south-west, but were mostly below the normal elsewhere by 2–4°, the deficit varying, however, between 0°·4 at Bedford and 5°·7 at Evelyn Valley. Similarly the night temperatures were above the average by amounts ranging from one or two tenths to over a degree in the Cape Peninsula and South-west, but were lower than usual elsewhere, mostly by amounts between half a degree and a degree and a half, but varying from 0°·3 at several stations in the South Coast section to 2°·9 at Evelyn Valley and 5°·0 at Hopefountain. The mean warmest station was Robertson, with a temperature of 67°·0, and the mean coolest, Hanover, with 54°·5, a difference of 12°·5. The highest mean maximum was 82°·7 at Mochudi, and the lowest mean minimum, 40°·8, at Hanover. The highest temperatures of the month at the various stations were registered on fourteen days, 1st, 4th, 8th to 10th, 12th to 14th, 16th, 17th, 22nd, 23rd, 26th, and 30th, principally on the 4th in the west, and the 12th and 13th in the east. The lowest temperatures were recorded on sixteen days of the month, 1st to 3rd, 6th, 7th, 16th, 17th, and 22nd to 30th, mostly during this last-mentioned cold spell, and then principally on the 29th. The mean of the highest readings (81°·9) was 10°·6 lower than during the previous month, and 7°·0 lower than in April, 1910. The mean value of the lowest readings (43°·2) was 3°·2 lower than the corresponding value during the preceding month, but 2°·6 higher than the similar value for April of last year. The mean monthly range (38°·7) was comparatively small. The extreme temperatures during this month were 96°·7 at Dunbrody on the 13th, and 31°·5 at Aliwal North on 29th, an extreme monthly range of 65°·2. *Frosts*, although more numerous than during either last month or the corresponding period of 1910, seem not to have been of any great severity, no damage being reported as having occurred from this cause. In all, forty-nine instances were noted on twenty days, 2nd to 6th, 10th, 11th, 15th, and 19th to 30th, principally on 27th to 30th. At Retreat (Cape Peninsula), the mean temperature on grass was 46°·0, or 6°·5 lower than the shade minimum, but 1°·3 higher than during April of last year; no instance of frost was recorded there, the lowest radiation temperature being 34°·9 on the 25th, and the highest, 56°·4, on 27th. The mean amount of *cloud* (44 per cent.) was high for the month, being 2 per cent. more than in March, and 6 per cent. more than during April of last year. It was fairly uniform in distribution over the greater part of the country, the divisional means being mostly between 40 and 50 per cent., but falling to 37 per cent. over the West Coast. Cloudiness ranged in amount from 13 per cent. at Mochudi to 66 per cent. at Dunbrody, being also mostly about 60 per cent. along the coasts. The number of *fogs* and *mists* reported was slightly less than last month, but greater than in April of last year, a total of 139 instances being noted on twenty-eight days, most widely on 10th, 11th, and 6th. The prevalent *winds* were Westerly (N.W. to S.W.) at practically the whole of the stations, but E. at Kuruman, N.E. at Mochudi, O'okiep, and Kokstad. The mean *force* on the Beaufort Scale was 1·67, corresponding to a velocity of 7·0 miles per hour, or 0·2 mile per hour less than last, and 0·3 miles per hour less than in April, 1910. The winds were strongest along the South Coast and over the South-west, and

weakest over the North-east. The Royal Observatory records show an increase of N.W., W.N.W., and S.S.E. winds, particularly of those from N.W., but a slight decrease of practically all other winds. The mean velocity there was 6·4 miles per hour, or 0·4 mile per hour less than usual, and 1·8 miles per hour less than last month. *Strong winds* and *gales* were slightly more frequent than last month or during the corresponding period of the preceding year, being reported from twenty-three stations on sixteen days, chiefly during the middle and at the end of the month. Five *hot winds* were noted at Uitenhage during the month. No *duststorms* reported.

The mean barometric pressure at the Royal Observatory was 30·10 inches, or 0·04 inch higher than usual. It ranged from 30·34 inches on the evening of the 1st to 29·84 inches on the evening of the 24th.

TEMPERATURE.

Station.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	73·3	55·8	64·5	94·0	4th	48·9	25th
Capetown (S.A.C.) ...	75·3	55·1	65·2	95·5	4th	48·0	25th & 29th
,, ,, (City Hospital)...	74·9	54·5	64·7	93·0	22nd	50·0	7th
Blaauwberg	69·3	55·0	62·2	93·5	4th	50·0	25th
Bishopscourt	72·0	49·4	60·7	89·5	4th	40·5	2nd
Wynberg...	73·6	53·4	63·5	90·0	4th	48·2	25th
Retreat	73·7	52·3	63·0	88·5	4th	41·9	25th
Groot Constantia	71·9	54·1	63·0	90·0	4th	49·0	23rd
Robertson (Exp. Farm) ...	78·8	55·3	67·0	92·0	12th	48·0	28th
Groot Drakenstein... ...	76·2	53·5	64·8	93·4	12th	44·4	29th
Elsenberg (Agr. College) ...	74·6	53·2	63·9	91·3	4th	46·1	24th
Danger Point	66·7	54·6	60·6	75·0	4th	48·0	17th
Port Nolloth	65·2	48·9	57·0	93·0	8th	42·0	22nd & 29th
O'okiep	78·8	54·4	66·6	89·0	8th	41·5	27th
Storm's River	71·7	54·0	62·8	93·5	13th	45·0	24th & 29th
Dunbrody	80·2	51·0	65·6	96·7	13th	39·5	3rd
Uitenhage	77·5	52·7	65·1	95·5	13th	42·3	29th
George (Plantation) ...	70·6	53·3	62·0	88·0	13th	46·0	24th
Port Elizabeth	70·6	57·1	63·8	85·0	13th	51·0	24th
Heidelberg	77·0	51·9	64·4	92·0	4th	42·0	29th
Cape Agulhas	66·5	57·0	61·8	72·0	14th	51·0	1st
Cape St. Francis	67·3	57·6	62·4	92·0	13th	53·0	16th, 29th, & 30th
Amalienstein	77·3	50·3	63·8	85·0	12th	40·0	29th
Hanover	68·3	40·8	54·5	75·0	23rd	33·0	28th
Murraysburg	69·9	45·0	57·4	79·0	13th	35·0	28th
Kimberley	77·5	50·4	64·0	86·2	10th	33·4	29th
Cathcart	66·8	48·5	57·6	77·9	13th	39·5	3rd
Bedford	75·2	49·0	62·1	86·0	12th	41·0	1st, 2nd, 24th, 28th, & 30th
Sydney's Hope	71·9	54·5	63·2	80·5	12th	42·0	7th
Kingwilliamstown... ...	75·7	52·8	64·2	89·0	13th	43·0	28th
Evelyn Valley	63·9	47·8	55·8	78·0	16th	40·0	2nd, 24th, 26th, & 29th
Chiselhurst	79·6	55·3	67·4	89·0	30th	47·0	26th
Aliwal North	72·1	42·8	57·4	79·5	9th & 23rd	31·5	29th
Queenstown	70·7	48·2	59·4	80·0	13th	38·0	29th
Kokstad	68·1	44·7	56·4	79·0	22nd	35·1	29th
Port St. John's	74·8	58·7	66·8	85·0	1st	53·0	3rd
Tabankulu	70·1	48·5	59·3	80·8	17th	38·3	2nd
Main	69·6	50·3	60·0	81·0	22nd	41·0	2nd
Mochudi	82·7	49·0	65·8	93·0	1st	38·0	28th
Hopefountain	74·3	51·0	62·6	82·8	26th	45·2	6th
Matopo Park	77·9	50·3	64·1	88·0	17th	42·0	6th
Means	73·0	51·3	62·2	81·9	—	43·2	—
Extremes ...	—	—	—	96·7	13th	31·5	29th

OBSERVERS' NOTES.

Uitenhage Park.—Rainfall above monthly average of past nine years. Five hot winds, and temperature high for season on some occasions. Fine autumnal month on the whole.

Huxley Farm.—Farming prospects good; plenty of grass for the winter; live stock selling and doing well; price of wood high; mealie crops average, but not high.

Sunnymeade (Albert).—Very wet month, after all the rain in March. Stock suffering from the effects of grass growing so fast. Slight frost from 21st, doing little damage.

Herschel.—Mealies and kaffir corn only crops; not very promising.

Thibet Park (Queenstown). A grand autumn and promises for a splendid winter.

Theefontein (Hanover).—Frequent showers all through month. Frost, first of season, on 3rd. Light hoar frost on 19th, 20th, 27th, 28th, and 29th. Veld very good, and all stock in excellent condition and free from disease.

Karnmelk's River (Caledon).—Drought very severe: practically no rain has fallen since early part of November; farmers all ploughing dry ground; the prospect for coming lambing season very bad.

Vruchtbaar (Wellington).—The rainfall on 18th and 27th was soft soaking rain, which was most welcome after the tremendous heat of the last two months. The soil is in fine condition for ploughing, which is going on uninterrupted.

Clifton (Sterkstroom).—Excellent month for crops, veld, and stock. No frost.

Kruis River (Uitenhage).—On the whole has been very warm this month: though 1½ inches of rain has fallen, it has not been sufficient for much ploughing; a little forage has been sown, but major portion of lands still require more rain to plough; barley, wheat, and rape are doing well. There has been some loss of stock near here, I hear, from redwater. On this station, cattle in good condition.

Groot Drakenstein.—Mean temperature of month 1°·1 above the average. Rainfall 45 per cent. of average. The rainfall towards the end of the month, though light, was of great benefit to the country, which was getting very scorched up.

Kokstad.—Rather more rain than usual in April. No frosts. Mealies are in places being reaped already.

TRANSVAAL.

OBSERVERS' WEATHER REPORTS FOR APRIL.

SUMMARY.—The rainfall for the month has generally exceeded the average, only the eastern and the south-western borders having shown deficits. The rainfall for the season (ten months) now shows a general tendency to approximate the average; but the eastern, the south-central, and the extreme south-western districts are still considerably deficient.

BARBERTON DISTRICT—

Barberton.—There have been some good rains during the month, and the total is above the average. The weather generally has been mild for this time of year. Several thunderstorms have been experienced. (A. C. Jackman.)

BETHAL DISTRICT—

Leeuwkuilen.—First frost was experienced on the 27th; up to the end of the month the weather has got warmer. Very heavy thunderstorms from the 19th to the 25th of the month, travelling from east to west. (W. J. Wayland.)

ERMELO DISTRICT—

Elspan.—The weather has been very warm for the time of year. First frost was experienced on the 27th, and then again on the 28th, but these have not done much damage to vegetation. (A. Middleton.)

Government Nursery, Ermelo.—The weather has been fairly warm and mild. Slight frost was experienced on the night of the 27th. Winds mostly light and always from east or west. (A. Drummond.)

HEIDELBERG DISTRICT—

Heidelberg.—The weather during this month was quite mild. A slight frost was observed in the valleys on the morning of the 28th. The late rains have considerably improved the mealie crop, which was to a great extent backward on account of the drought experienced during the summer season. (W. A. ter Horst.)

LYDENBURG DISTRICT—

Belfast.—The opening of the month was dull and cold, with driving mist and rain. Good rains again fell towards the end of the month. The middle of the month was warm, but after the last rains ground frosts were experienced. (G. J. Imrie.)

Graskop.—Thunderstorms have been frequent during the latter part of the month. (G. Irvine.)

MIDDELBURG DISTRICT—

Middelburg.—The leading feature of the weather this month has been the continuance of the rains of summer well into this the first winter month. It is most unusual to get such heavy falls at the end of the season, but the rainfall this season has in many ways been very erratic, e.g. 1¼ inch in November instead of the usual 6 inches, the drought from mid-January almost to mid-March. However, the heavy fall which has come so late will no doubt be the cause of strong springs and abundance of good grass for stock well into the winter, if not throughout it. (Dr. H. A. Spencer.)

PIET RETIEF DISTRICT—

Cascades.—The weather was most peculiar at intervals during the month. On the evening of the 23rd a heavy thunderstorm broke over the district, accompanied by lots of hail. Slight frosts were experienced on the 25th and 26th. Days were generally fine and bright. (F. Bresler.)

STANDERTON DISTRICT—

Standerton.—Cold weather was experienced at the beginning of this month. (A. Wilson.)

SWAZILAND—

Bremersdorp.—A wet month for the time of year. (J. H. Howe.)

Piggs Peak.—Unusually wet for the time of year. (Swaziland Police.)

WAKKERSTROOM DISTRICT—

Wakkerstroom.—This month generally has been cold and damp; heavy dews have fallen on several nights. (W. Pritchard.)

ZOUTPANSBERG DISTRICT—

Verzamelhoek.—Late rains have been very beneficial to crops of wheat and oats in the neighbourhood. No sign of frost as yet. (G. F. Kay.)

OBSERVERS' NOTES.—MAY.

SUMMARY.—The heavy rainfall for the month is unprecedented in the meteorological records of the Province. In every district the average was exceeded, those on the eastern border and in the central-south, in addition to Marico, showing a considerable excess. The season's rainfall (eleven months) is now generally up to or over the average, but there is still a deficit over the north-eastern and south-western districts of the Province; thus at Leydsdorp the eleven months' rainfall is 7 inches below the average.

BARBERTON DISTRICT—

Barberton.—The weather during this month has been very unusual; the rainfall is a record, and there have been several thunderstorms. A great deal of wind has also been experienced. (A. C. Jackman.)

BLOEMHOF DISTRICT—

Zoutpans No. 169.—The rain during this month has been very gentle, and of a soaking nature. (W. G. C. Andrews.)

HEIDELBERG DISTRICT—

Heidelberg.—The weather during May was very unsettled, the rain was excessive for the season, and frost was only observed during the latter part of the month. (W. A. tèr Horst.)

LYDENBURG DISTRICT—

Graskop.—A few thunderstorms were experienced, and on the last few nights of the month ground frost prevailed. (G. Irvine.)

MARICO DISTRICT—

Leadmines.—Good steady rains fell during May. Heavy frosts were experienced during the latter part of the month. (C. Hains.)

SWAZILAND DISTRICT—

Piggs Peak.—Cold, wet, and generally unseasonable throughout the month. (Swaziland Police.)

WAKKERSTROOM DISTRICT—

Wakkerstroom.—An exceptional month on account of the cold, misty rains. (W. Pritchard.)

ZOUTPANSBERG DISTRICT—

Elim, Spelonken.—Most extraordinary weather—damp, cold—luxuriant veld, and no frost as yet. (H. Mingard.)

Louis Trichardt.—A phenomenally wet month. The long series of damp days in April was followed by a rise in temperature, of which the maximum reading for the month was recorded on the 5th, viz., 85·2 degrees, and a drop to 66 degrees followed on the 6th, when cold, misty, rains again set in, with the temperature never exceeding 74 degrees during the remainder of the month, the lowest minimum reading being 38·2 degrees on the 30th.

A wetter May has never been known at this station, and in the more sheltered positions in the neighbourhood—especially in the low country to the east, and where no frost has occurred—a severe recrudescence of malaria and horse-sickness has resulted from the unseasonable dampness. Frosts have been reported on two or three occasions from the flat open country to the west and from the mountains. (Sergt. J. C. N. Clark, T.P.)

Rainfall, May, 1911.

CAPE PROVINCE.

I. Cape Peninsula:	Inches.
Royal Observatory (a) 12-inch gauge ...	5·20
Capetown (Fire Station) ...	5·40
Do. (South African College)	6·60
Do. (Molteno Reservoir) ...	7·29
Do. (Platteklip) ...	8·99
Do. (Signal Hill) ...	5·17
Do. (Hospital) ...	3·86
Camps Bay ...	2·19
Table Mountain (Disa Head) ...	3·88
Do. (Kasteel Poort)	6·16
Do. (Waai Kopje) ...	3·37
Do. (St. Michael's) ...	8·19
Newlands (Montebello) ...	3·21
Kenilworth ...	2·95
Wynberg (St. Mary's) ...	2·83
Groot Constantia ...	2·44
Tokai Plantation ...	2·64
Muizenburg (St. Res.) ...	1·98
Blaauwberg Strand ...	3·84
Robben Island ...	3·17
Tamboers Kloof ...	5·65
Woodhead Tunnel ...	3·80
Lower Reservoir ...	7·61
MacLears Beacon ...	7·45
Waai Vlei ...	7·71
Woodhead Dam ...	7·32
Retreat ...	2·23

II. South-West:	Inches.
Eerste River ...	5·25
Klapmuts ...	4·79
Stellenbosch (Gaol) ...	8·79
Somerset West ...	4·63
Paarl ...	4·89
Wellington (Gaol) ...	3·15
Groot Drakenstein (Weltevreden)	1·13
Porterville Road ...	0·86
Ceres Road ...	1·82
The Oaks ...	1·46
Rawsonville ...	2·35
Caledon ...	6·78
Worcester (Gaol) ...	1·20
Hex River ...	0·70
Karnmelks River ...	6·16
Lady Grey (Division Robertson).	1·22
Robertson (Gaol) ...	1·30
Do. (Govt. Plantation) ...	1·34
Montagu ...	6·87
Danger Point ...	2·68
Elgin Plantation ...	8·49

II. South-West (*continued*):	Inches.
Elsenberg Agricultural College ...	4·33
Ceres (Heatlie) ...	1·35
Waverley (Tulbagh) ...	1·40
Dwaars Riviers Hoek ...	7·22

III. West Coast:	Inches.
Port Nolloth ...	0·50
Anenous ...	1·73
Klipfontein ...	1·68
Kraaifontein ...	1·75
O'okiep ...	1·77
Springbokfontein ...	2·90
Concordia ...	1·51
Garies ...	1·41
Lilyfontein ...	2·60
Van Rhyn's Dorp ...	0·28
Dassen Island ...	2·78
Kersefontein ...	0·88
The Towers ...	2·17
Malmesbury ...	1·42
Piquetberg ...	0·60
Wupperthal ...	0·47
Hopefield ...	1·12
Algeria (Clanwilliam) ...	1·06
Cedarberg (Clanwilliam) ...	1·05

IV. South Coast:	Inches.
Cape Agulhas ...	2·78
Swellendam ...	8·58
Potteberg ...	4·65
Grootvaders Bosch ...	10·62
Heidelberg ...	2·52
Riversdale ...	4·85
Vogel Vlei ...	4·37
Mossel Bay ...	4·30
Great Brak River ...	4·12
George ...	6·90
George (Plantation) ...	6·74
Sour Flats ...	3·07
Buffel's Nek ...	6·60
Plettenberg Bay ...	4·77
Harkerville ...	5·78
Blaauwkranz ...	4·72
Lottering ...	4·04
Witte Els Bosch ...	4·57
Humansdorp ...	3·27
Cape St. Francis ...	2·77
Kruis River ...	1·75
Uitenhage (Gaol) ...	1·56
Do. (Park) ...	1·41
Do. (Inggs) ...	1·50

IV. SOUTH COAST (continued):

Station	Inches.
Dunbrody	1·64
Port Elizabeth (Harbour)	2·50
Do. (The Slip)	2·46
Do. (Walmer Heights)	2·87
Shark's River (Nursery)	2·50
Centlivres	1·43
Edinburgh (Knysna)	4·58
Gamtoos Station	3·34
Zoetendals Vallei	3·77

V. SOUTHERN KAROO:

Station	Inches.
Triangle	0·39
Pietermeintjes	2·69
Ladismith	6·36
Amalienstein	4·92
Calitzdorp	3·96
Oudtshoorn	4·70
Vlaakte Plaats	2·58
Uniondale	2·88

VI. WEST CENTRAL KAROO:

Station	Inches.
Prince Albert	3·56
Dunedin	1·54
Nels Poort	2·03
Camfers Kraal	1·76
Krom River	1·27
Roosplaats	1·44
Lemoenfontein	1·56
Merweville	1·03
Baakens Rug	1·67
Willowmore	0·83
Rietfontein	0·92
Steytlerville	1·48

VII. EAST CENTRAL KAROO:

Station	Inches.
Aberdeen (Gaol)	1·43
Klipplaat	0·91
Kendrew (Holmes)	0·88
Graaff-Reinet (Gaol)	0·90
Do. (Eng. Yard)	0·70
New Bethesda	0·47
Roodebloem	0·78
Glen Harry	0·75
Wellwood	0·43
Bloemhof	0·52
Jansenville	0·92
Roode Hoogte	0·82
Toegedacht	0·68
Klipfontein	0·74
Middlewater	0·56
Somerset East (Gaol)	1·98
Spitzkop (Graaff-Reinet)	1·25
Gordonville (Graaff-Reinet)	1·58
Muchputfontein	0·71
Zeekoe River	0·95

VIII. NORTHERN KAROO:

Station	Inches.
Calvinia	0·47
Sutherland	1·65

VIII. NORTHERN KAROO (continued):

Station	Inches.
Fraserburg	1·76
Carnarvon	1·84
Brakfontein	1·60
Victoria West	1·61
Britstown	1·01
Wildebeestkooij	0·92
Murraysburg	2·06
De Kruis (Murraysburg)	2·21
Richmond	1·65
Hanover	0·83
Theefontein	0·50
Philipstown	0·53
Petrusville	2·67
The Willows (Middelburg)	0·80
Colesberg	0·82
Cradock (Gaol)	0·72
Witmoss	1·00
Maraisburg	0·37
Steynsburg (Gaol)	0·96
Tarkastad	1·36
Waverley	0·82
Schuilhoek	0·89
Vosburg	2·28
Zwavelfontein	0·95
Klipkraal (Richmond)	2·59
Hotweg Kloof (Cradock)	0·62
Thebus Waters	0·42
Ruightersfontein	0·63
Zoetvlei (Richmond)	1·66

IX. NORTHERN BORDER:

Station	Inches.
Kenhardt	1·53
Upington	1·11
Van Wyks Vlei	1·65
Prieska	1·06
New Year's Kraal	0·95
Dunmurry	1·88
Griquatown	1·28
Douglas	0·90
Douglas (Voss)	0·90
Hope Town	0·91
Newlands (Barkly West)	1·63
Barkly West	2·57
Kimberley (Stephens)	2·11
Strydenburg	1·01
Rietfontein (Gordonia)	0·46
Stoffkraal (Prieska)	0·96
Sunnyside (Hay)	1·13
Rocklands	1·69
Peters Park (Gordonia)	1·53
Sydney-on-Vaal	2·35
Warrenton	1·60

X. SOUTH-EAST:

Station	Inches.
Melrose (Division Bedford)	1·60
Dagga Boer	1·61
Alicedale	2·27
Cheviot Fells	1·35
Bedford (Gaol)	2·41
Sydney's Hope	3·46
Adelaide	2·32

X. SOUTH-EAST (*continued*):	Inches.
Atherstone	2·24
Alexandria	4·38
Fort Fordyce	3·89
Grahamstown (Gaol)	3·70
Heatherton Towers	1·43
Sunnyside	3·64
Fort Beaufort	3·12
Katberg	4·45
Seymour	3·26
Glencairn	4·64
Lovedale	3·34
Port Alfred	3·12
Hogsback	7·11
Peddie	2·41
Keiskamma Hoek	3·31
Cathcart (Gaol)	1·83
Cathcart (Forman)	1·85
Cathcart	1·85
Thaba N'doda	4·40
Evelyn Valley	8·97
Crawley	0·89
Pirie Forest	3·59
Isidenge	4·01
Kologha	2·16
Kingwilliamstown (Gaol)	2·23
Fort Cunynghame	4·48
Dohne	1·30
Kubusie	3·68
Quacu	1·47
Blaney	1·09
Bolo	1·63
Komgha (Gaol)	2·73
Cata	4·39
Wolf Ridge	6·14
Dontsah	3·31
Albert Vale (near Bedford)	1·62
Huxley Farm (Stutterheim)	2·04
Amabele Junction	2·30
Insileni (Kingwilliamstown)	3·70
Kingwilliamstown	3·11
Eastover	2·34

XI. NORTH-EAST:	
Venterstad	0·77
Mooifontein	1·57
Burnley (Cyphergat)	1·27
Lyndene	0·90
Thibet Park	1·35
Sterkstroom (Gaol)	0·78
Rocklands	0·77
Aliwal North (Gaol)	1·08
Jamestown	1·40
Queenstown (Gaol)	0·39
Do. (Beswick)	0·89
Middlecourt	1·18
Dordrecht	2·32
Herschel	2·04
Lady Grey	2·13
Lauriston	1·86
Lady Frere	1·02
Keilands	1·85
Barkly East	1·28
Hughenden	0·90

XI. NORTH-EAST (*continued*):	Inches.
Indwe (Collieries)	1·36
Sunnymeade (Division Albert)	1·01
Clifton (Sterkstroom)	0·81
Edendale	0·88
Strydpoort (Dordrecht)	2·65
Avoca (Barkly East)	2·87

XII. KAFFRARIA:	
Ida (Xalanga)	1·80
Slaate (Xalanga)	2·16
Cofimvaba	1·96
Tsomo	1·88
N'qamakwe	3·40
Main	1·90
Engcobo	3·09
Butterworth	2·21
Woodcliff	1·71
Kentani	2·22
Bazeya	3·63
Willowvale	3·06
Somerville (Tsolo)	1·06
Elliotdale	2·46
Umtata	1·22
Cwebe	5·70
Tabankulu	2·13
Kokstad	0·93
Do. (The Willows)	1·07
Flagstaff	1·45
Insikeni	0·92
Umzimkulu	4·82
Umzimkulu (Strachan)	0·71
Lusikisiki	2·98
Tentkop (Elands Height)	2·29
Dihota	1·48
Ndabakazi	1·97
Clarkbury (Engcobo)	2·34
Kilrush	0·93

XIII. BASUTOLAND:	
Mohalies Hoek	1·98
Maseru	2·20
Teyateyaneng (Berea)	1·94
Moyeni Quthing	2·36
Qachas Nek	2·92

XIV. BECHUANALAND:	
Taungs	0·88
Vryburg	2·30
Mafeking	2·76
Kuruman	1·58
Zwartlaagte	1·93
Nottinghame	2·17
Masilibitsani	1·44
Armadillo Creek	1·64
Mochudi	2·53
Morokwen	1·58

NATAL.

	Inches.		Inches.
Umblangeni (Lower Umzimkulu) ...	3·05	Cedara (Vlei)	0·57
Winkel Spruit	1·60	Giant's Castle	0·72
Ottawa	1·62	Weenen	1·52
Cedara (Hill)	0·61		

TRANSVAAL.

Barberton	3·02	Pretoria (Arcadia)	2·16
Komatipoort	2·80	Modderfontein	3·11
Bethal	3·29	Rustenburg	1·78
Christiana	1·50	Standerton	1·93
Carolina	2·02	Mbabane	3·73
Ermelo	2·22	Volksrust	2·11
Vereeniging	3·74	Wakkerstroom	1·45
Heidelberg	3·68	Potgietersrust	2·69
Lichtenburg	2·42	Krugersdorp	3·35
Pilgrims Rest	5·49	Joubert Park	4·09
Belfast	2·26	Observatory	3·86
Zeerust	6·12	Wolmaransstad	2·33
Middelburg	2·91	Pietersburg	0·89
Piet Retief	3·03	Louis Trichardt	4·34
Potchefstroom	2·49	Leydsdorp	5·05
Klerksdorp	2·94		

Departmental Notices.

EXPERIMENTAL FARM, POTCHEFSTROOM.

SEEDS FOR DISPOSAL.

POTATOES.

First crop from imported seed: medium and "seed" size mixed.

Price: This will be determined by the market rates ruling at the time of delivery, and can be obtained on application.

Varieties.—

Medium.—Factor and Red-skinned Flourball.

Late.—Scottish Triumph, Up to Date, Duchess of Cornwall, Five Towers, Charles Fidler, White Elephant, and Superlative.

These potatoes will be ready for issue about the beginning of September.

MAIZE (MEALIES).

Price 20s. per 100 lb. delivered at buyer's station.

Colour and Character.	Variety.	Maturity.
White (Dent).............	Hickory Horsetooth...........	Late.
White (Dent).............	Hickory King................	Medium Late.
White (Dent).............	Iowa Silver Mine.............	Medium.
Yellow (Flint).............	Yellow Cango................	Medium.
Yellow (Dent).............	Eureka......................	Medium Early.
White (Dent).............	Champion White Pearl........	Medium Early.
Yellow (Dent)	Chester County Mammoth.....	Early.
White (Dent).............	Natal White Horsetooth (for silage purposes)	Very late.

This seed is shelled from carefully selected, butted, and tipped ears, true to the type and character of each variety. The greatest care is exercised to ensure uniformity in the seed supplied. Some varieties are, however, somewhat "unstable" in their characteristics, and in exceptional cases cross-fertilization may have escaped detection. These deficiencies are reduced to a minimum as far as care in the selection of the seed will permit.

Medium and late varieties are recommended for districts with a long growing period; the medium-early and early varieties are the most suitable for districts with shorter growing periods.

Applicants who have no particular choice in regard to varieties are requested to state in their applications whether they prefer white or yellow varieties, when the seed will be sown, and when the first frost generally occurs on their farms. The undersigned will then select those varieties which are likely to prove the most suitable.

Applications for these seeds should be made on or before the 12th August. No order will be "booked" until that date, but applications may then be closed and the available supply distributed *pro rata* among the different applicants. In that case only orders which are then definitely placed will be considered; an inquiry which is still the subject of correspondence will not be considered a definite order.

Orders must be accompanied by remittance, or if the seed is to be forwarded on the c. o. d. system, this authority must be given by applicant. Cheques and money orders should be drawn in favour of the General Manager, Experimental Farm, Potchefstroom, from whom any further particulars can be obtained. When remitting by cheque, exchange to be added. Postal orders should be endorsed.

ALEX. HOLM,
General Manager.

FARM EMPLOYMENT.

Applicant, aged 18, desires employment on a farm. Has been brought up on a farm, and understands the handling of sheep, cattle, horses, and general agriculture.—J. L. M. DANIEL, Rietfontein No. 64, Platrand P.O., via Standerton, Transvaal. [5]

Applicant, aged 18, desires employment on a farm. Has had no previous experience of farm work.—G. M. MARITZ, Rietfontein No. 64, Platrand P.O., via Standerton, Transvaal. [5]

Applicant, aged 27, desires to obtain a situation on a farm, anywhere in the Union of South Africa. Accustomed to working with horses, mules, and oxen. Understands all kinds of farming (agricultural and stock), and has had eight years' experience of farming in Natal. Has knowledge of veterinary matters, and understands castration of all classes of stock.—H. H. WILLEY, Dwaar's Nek, Hatting Spruit, Natal. [5]

MR. E. SHARRATT, Brakwal, P.O. V. K. Kop, District Harrismith, Orange Free State, has a vacancy for an apprentice on his farm, where both general and stock farming are carried on. Youngish lad preferred, and one not afraid to work. [6]

Englishman, 19 years old, recently arrived in this country, desires employment on farm. Is strong and healthy and used to hard work.—ERIC SMITH, P.O. Box 1432, Capetown. [6]

Applicant desires employment on a farm.—Address communications to: E. W. MCDONALD, Drummond, Whittlesea, Cape Province. [6]

Scotch tenant farmer, with life experience of pedigree and prize stock, desires management of stud or stock farm, or to assist on large ranch. Especially desirous of getting into touch with person wishing to import Clydesdales. Eight years in Africa; retrenched from Government service; testimonials and references: age 45; not married.—Apply A. W. DORMAN, Wessels Nek, Natal. [7]

Government School of Agriculture, Potchefstroom.

The School of Agriculture, Potchefstroom, will be prepared to receive a certain number of students at the beginning of August, 1911, for a short course of practical instructions preparatory to the commencement of the ordinary two years' course which commences in January, 1912.

The residential staff consists of Lecturers in Agriculture, Veterinary Science, Field Engineering, Chemistry, Botany, Zoology and Entomology, and a Dairy instructor, who are assisted by officers of the Department of Agriculture, other non-resident lecturers, and the staff of the farm, Poultry, and Horticultural Divisions.

The following are the conditions governing admission :—

(1) Candidates must be over sixteen years of age.
(2) The fees, which are payable quarterly in advance, are £50 per annum, inclusive of board, laundry, and ordinary medical attendance.
(3) By making application for admission, candidates will, if accepted, be deemed to have undertaken to remain at the school for a period of two years, dating from January, 1912.
(4) Candidates must furnish proof that they have passed either the sixth standard of an elementary school, the school higher examination, the matriculation examination, or their equivalents.
(5) Candidates must furnish evidence of good moral character and of good health with their applications.

Applications, supported by the requirements mentioned in these conditions, should be submitted to the Warden, School of Agriculture, Experimental Farm, Potchefstroom, on or before the 15th July, 1911.

Agricultural Show Dates, 1911.

NATAL PROVINCE.

New Hanover.—20th July.
Richmond.—20th July.
Mid-Illovo.—10th August.

The Agricultural Journal

OF THE UNION OF SOUTH AFRICA.

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Advertising inquiries should be addressed to the Metropolitan Advertising Co., Box 962, Capetown.

Title Page and Index for Volume I.

The title page and index for the first volume of the *Agricultural Journal* of the Union of South Africa is published with the current issue, and all subscribers should receive a copy to enable them to have the volume bound. Any subscriber not receiving a copy enclosed with his *Agricultural Journal* would confer a favour by communicating with the Editor, Department of Agriculture, Pretoria. As regards the binding, subscribers will have to make the best arrangements they can locally, but we may add that any reputable firm of printers can arrange to do this at a fairly reasonable rate according to the quality of binding desired. Some correspondents have suggested that it would facilitate this being done, and the volumes kept as a permanent record and work of reference, if covers could be issued by the printers at a certain fixed rate. This subject has been discussed, and as there are several technical objections which make it impracticable it had to be dropped.

Correspondence.

There seems to be still a great deal of confusion in the minds of many of our correspondents as to the addressing of letters dealing with *Journal* matters. All subjects connected with subscriptions and publication should be addressed to the Government Printer, all subjects affecting advertising should be addressed to the Metropolitan Advertising Co., St. George's Street, Capetown, who hold the contract, and only subjects affecting the literary side of the *Journal* should be addressed to the Editor, Department of Agriculture, Pretoria. We are constantly receiving letters dealing with subscriptions, publication, advertisements, etc., which should go to the Government Printer or the advertising contractors, while letters asking for information are as frequently addressed to the latter, with which it is impossible for them to deal. It would save a great deal of trouble if correspondents could bear these details in mind, and would also expedite answers to their letters.

The Soya Bean.

As a subject of considerable discussion the Soya Bean has occupied a good deal of attention lately in very widely extended circles. The virtues and advantages of this crop for many purposes

have been fully dilated upon, and the more it has been studied the more it seems to impress itself as one of the coming crops of the future. In this issue we are in the position of being able to place before our readers some exceedingly interesting information on this subject, obtained at first hand by means of what appear to be fairly exhaustive experiments carried out by the departmental experimentalist staff in Natal. It is early yet to fully discuss the results so far obtained, but that they are more than satisfactory is very clear, and that they promise to lead to even more encouraging results in the not distant future is also fairly certain. What the practical farmer likes to see in reports of this description is, usually, the net cash results. When he is satisfied on this point he looks at matters a little closer. But in this case it is as yet early to expect commercial returns, even on a hypothetical basis, so we must be content to follow the experimentalists for the time being and take what profit we can from the results of their investigations.

One of the great needs of the whole of South Africa is what may be described as new crops. That is, something to vary the usual monotony of the field crops of the country and enable us to adopt some more economic methods of cultivation than those generally in vogue. In this direction the Soya Bean promises to prove helpful, for while it is apparently a commercial crop of some value for oil, with an apparently assured market for soap making and other purposes, it is also of value as a rotation crop for maize. The peculiar conditions it seems to demand are those which would seem to fit in very well with maize, and if this phase of the case can be demonstrated the Soya Bean must eventually become an important factor in many sections of this country where the maize crop is of great importance. Farmers near the coast belt in the south-eastern districts of the Cape would do well to give these experiments some attention, as they should prove of interest to them.

Heart Injuries in Cattle.

The article on Traumatic Pericarditis of Cattle in the current issue is worthy the attention of all who have to deal much with large stock. Cases are constantly arising of injuries such as those described causing death, and the fatalities being ascribed to something quite different. But this is not the only point of special interest about this matter, the more important is the moral which is to be deduced. These fatalities would not be nearly so common if people connected with farms and farming generally were more deeply impressed with the necessity of preventing such accidents and trained to treat the little carelessnesses which give rise to them with more seriousness. It is the bits of broken wire—sometimes fencing, at others baling—and the odd nails which fall from broken-down buildings or smashed-up packing cases which are the initial trouble. These are left about, get into fodder or bedding, or even get hidden away in succulent grasses near the homestead. The unfortunate animal picks them up and the next thing is illness and death. Now a good farmer or stockman is usually very careful about such matters as he knows the full danger of carelessness, but the average farm hand of this country or the coloured help in byre or stable knows nothing and cares less.

It is to these that attention should be given and every opportunity taken of impressing upon them the enormous risks which the stock run through the reckless and untidy habit of leaving small things lying about which may contain hidden dangers. There are farmers in South Africa who go so far as to make the farm servants carefully pick up every atom of litter on or near the werf, but these are few and far between, unfortunately. Their number would increase very considerably were it thoroughly realized that these scraps and litter so frequently contain the causes of serious losses in stock. And as to the fiend who is responsible for loose pieces of baling wire in lucerne or other hay bales—it is difficult to imagine a punishment sufficiently drastic for his offending; for that is the unpardonable sin.

Lamziekte and its Prevention.

The report on the tests of the Mayers alleged preventive for lamziekte appears in this issue, and it discloses the fact that the alleged preventive has no protective power whatever. As a matter of fact the final results rather tend to show that the animals treated by the Mayers method seemed to be more susceptible to the disease than those left severely alone to take the ordinary risks. In the case of the animals treated by Mr. Mayers the death-rate from the disease amounted to 5 per cent., while the death-rate among the non-treated animals did not exceed 2.5 per cent. The details of the report are quite interesting reading and should serve to check those enthusiasts who are always discovering new and effective remedies for every obscure disease in the country. Lamziekte is certainly a puzzling subject, and it seems destined to defy the investigators yet a while longer. So far the country has still nothing beyond the palliative treatment suggested years ago by the late Duncan Hutcheon, namely feeding with sterilized bonemeal and salt. The real worry about the matter is that this fails in its effects in some cases, and the disease is reported to get worse in certain sections as years go by.

Irrigation Advice.

All interested in irrigation should read the notice in the current issue, showing the distribution of the Union Irrigation Department throughout the country. In case of doubt as to where to turn for advice it is always safe to address to the Acting Director of Irrigation, P.O. Box 444, Pretoria. The great thing to remember is that advice is obtainable.

International Congress of Apiculture.

The following translation of a circular letter which has been received from Professor Perroncito, President of the International Congress of Apiculture, is published for general information:—"During next September the Fifth International Congress of Apiculture will be held at Turin, and I should like South Africa to be represented by some distinguished bee experts, and I would accordingly be glad if you would interest yourself in the matter. If there are any other persons interested in apiculture who would like to send in a report to the congress on apiculture in South Africa, you will do the committee a great pleasure by bringing this matter to their notice."

Transkei Natives and Persian Sheep.

The attention of farmers and others who employ native labour from the Transkei territories is drawn to the fact that the introduction of Persian sheep into those territories is strictly prohibited under Proclamation No. 162 of 1910, and that the practice (followed by a number of employers) of paying natives with Persian sheep is undesirable as such sheep cannot be taken to their homes by the natives. It should be further noted that the prohibition includes cross-bred Persians as well.

Dates in South Africa.

In the course of a letter to the Acting Entomologist for the Union (Mr. C. P. Lounsbury), Mr. W. T. Swingle, of the United States Department of Agriculture, who was responsible for the introduction of selected dates into the United States (for which purpose he visited the Sahara), writes:—" Do you cultivate date palms in South Africa? This year we have begun to ripen our dates artificially, and the process is very simple and very easy, as you will learn when you see a copy of an article I propose to publish shortly on the matter. If you have any hot, dry regions in South Africa you ought to try dates. They will stand a lot of cold and are not injured by temperatures as low as 10° F. when once they get established. Some of the seedlings of our co-operators planted three or four years ago are now bearing excellent fruit. It is not necessary to import offshoots to get good dates." Mr. Swingle has lately shown that dates are a delicious fruit when fresh, and that they can be transported to distant markets in an immature state and then ripened by an artificial process.

Zebras as Transport Animals.

The following interesting report on the use of the zebra for transport purposes has been furnished by the Magistrate, Ubombo (Zululand):—" Dunn's team consisted of eight zebras, two of which are fully grown animals, two about three parts, and the remainder only half grown. The wagon used was of the light donkey class, and having a capacity of 1½ to 2 tons, the load weighed approximately 1½ tons." On one occasion, the Magistrate says, " the wagon started at the bottom of a steep incline, with a bad turn half way. The ground was wet and in some places slippery. It was a fair test of willingness and power, particularly the former, as it was commenced with a 'cold collar'. The zebras pulled in a determined and concerted manner, and in my opinion accomplished as much as eight ordinary mules would have done.

" In the sandy country, where it is one continuous pull, they seemed to be only able to do treks of two miles with half loads, and appeared to suffer more from hunger than physical exhaustion. After a feed they would resume the journey without hesitation. Had they been fed on mealies, which they eat readily, I am convinced they could have done longer treks. With regard to their staying capacity, I may mention that, on remarking once to a Dutch farmer that it seemed singular so little use was made of the zebra when they were in numbers in the high veld, he informed me that it was due to this lack of staying power, and that a pair he once owned were knocked up after a 30-mile journey.

"On a hard, level road Dunn's team travelled at the rate of 3 miles an hour. On two occasions the team, when grazing. got into touch with wildebeest and moved off with them, but were recovered by the wagon boys on foot. A donkey which is inspanned with the zebra is stated to be more addicted to stampeding than they are. The donkey appears to be immune from *ngana*. On an average road they trek about fourteen miles a day. The conclusions arrived at on the evidence furnished by this team, exclusive of the supreme quality of immunity from disease, are as follows:—They respond quickly to the whip when pulling, they are not given to plunging, but crouch down and pull steadily; they keep their condition without corn-feeding, and they appear more intelligent than mules or donkeys. Against these qualities may be quoted the lack of stamina, which was disclosed when working in the sandy veld, but this I think was mainly due to want of corn-feeding, for it seems barely possible for it to be a characteristic failing of the species, as they are of muscular build, although light-boned. As the scientists may pronounce it to be due to heredity causes, it may be remarked that it is singular that an animal which so readily discards its natural instincts to embrace domestication should yet be so tenacious of that one quality."

Coffee-Tea.

Mr. J. Medley Wood, Director of the Natal Botanic Gardens, Durban, writes:—"More than forty years ago, when the writer was residing on his farm, he had a small plot of coffee in bearing and a larger plot which had not come into bearing. It occurred to him that the young leaves which had to be removed after pruning might be utilized for making 'coffee-tea'. A small quantity was made, and a pound or two was exhibited at an agricultural show which was held in Durban and an 'honourable mention' card was awarded to him for the exhibit. After the closing of the show the tea was sampled at Mr. Robert Acutt's store, and most (if not all) of those who tried it liked it, some even preferring it to the ordinary tea of that day. Soon after this the writer sold his farm, and on account of his health removed to a higher district, so nothing more was done in the matter. An article, copied from the *Manila Bulletin*, has lately appeared in the *Tropical Agriculturist*. It is as follows:—'Coffee and tea have been so long known to the world, and have given so much delight to millions of people, that it seems to be a very singular statement to make, at this late day, that man has not yet availed himself of some of the most valuable properties of these plants. Such, nevertheless, appears to be the case, especially with regard to the coffee plant. The stimulating power of tea and coffee is due to what is known as theine or caffeine, but tea contains a large percentage of tannin, which is not a desirable component in a beverage, and coffee, while less rich in theine than tea, possesses other properties which give it flavour as a drink. . . . It is true that the leaves of the coffee plant are not only available for making a beverage, but they possess properties which make them in some respects more valuable than the coffee bean. In appearance and fragrance the dried coffee leaves very much resemble those of ordinary tea, an aromatic beverage is produced which is bitter to the taste, but not disagreeably so, and which contains almost as much theine as an ordinary tea, while there is a notable

falling off in the proportion of tannin. It has been suggested that this 'coffee-tea', though not quite so agreeable to the uneducated taste as either of the other beverages, may become an important article of diet, since it is admirably refreshing and restorative in its effects, and at the same time would not prove disagreeable to people who are unable to drink ordinary tea or coffee.'"

It will be noticed (Mr. Medley Wood proceeds) that the writer of the article quoted says "an aromatic beverage is produced which is bitter to the taste, but not disagreeably so". The coffee-tea produced by the writer in Natal certainly had no bitter taste, and its freedom from it was probably due to the care taken in its preparation. After the leaves had been sufficiently wilted they were taken to the house, rolled into balls with the hands, thus getting rid of the greater part of the sap, and were afterwards dried over a slow fire. This rolling process is, I understand, done in the manufacture of ordinary tea by machinery, and in the case quoted in the *Tropical Agriculturist* was probably omitted altogether. Coffee is still grown in some parts of Natal, and possibly in other parts of South Africa also, and as the leaves proposed to be used in the preparation of this coffee-tea are those which are removed in the processes of pruning and handling, it will be seen that the production of the coffee-tea will be a by-product, the only cost being the labour of manufacture.

Vermin Destruction.

The manager of Mr. Abe Bailey's Colesberg Farms Estate, Oorlogs Poort, Arundel, forwards a list of vermin destroyed on the estate during the six months ended 30th June. The figures are as follows:—Jackals, 154; lynx, 20; wild cats, 113; baboons, 24; eagles, 25.

Barley for Malting Purposes.

With reference to the note which appeared in the June issue calling attention to the fact that the South African Breweries, Limited, have imported a quantity of seed barley for distribution among farmers, the Acting General Manager of that company now writes that the notice has created such a demand for the seed that the stock of same has been exhausted. He adds that it is the intention of the company to distribute seed again next year, and the London office is being requested to arrange for larger supplies being sent.

Importation of Pedigree Stock.

The Union-Castle liner, "Cawdor Castle", recently landed two valuable consignments of English pedigree stock for Kimberley and Rhodesia. The first consisted of fourteen bull calves, eight months old; the famous roan Shorthorn bull, Fritz; and two other fine red Shorthorn bulls, Laurete Champion and Blood Orange. These were specially selected and purchased by Mr. L. E. Homan, and were consigned to the Bellsbank and Exploration Co., Ltd., Kimberley. It is the intention of this company to retain the animals for breeding purposes, as it purposes to deal largely in future with the production of butter and cheese. The company, it is of interest to note, has

acquired an estate of 130,000 acres. The second consignment was for Mr. Williamson, on behalf of Messrs. Whitfield & Co., auctioneers, Salisbury, and consisted of seven Aberdeen-Angus bulls, viz., Anotole, Touchstone of Leith Hall, Knight Errant, Lord Emblem, Prince Fabian, Aberdeen-Angus, and Demora Vineyard of Skillymarno; and six Shorthorns, viz., Prince Albert of Titaboutie, Diamond King, Lord Edwin, Spice Box, Uncle, and Diamond Prince, together with the well-known galloway, Lord Barclay. They were accompanied by three very fine Hereford bulls, viz., Staunton Comrade, Gipsy Boy, and Buccaneer. The latter were specially selected and purchased by Messrs. Antony Hope & Smith, and the others by Messrs. Reith & Anderson. It should be mentioned that the galloway, Lord Barclay, is the first of its kind imported into Rhodesia. The animals were all landed in the pink of condition, Messrs. W. H. Williamson and C. H. Mitchell (representing the Bellsbank Company) being delighted with their condition.

Fruit Export.

The South African Railways Administration has notified that it has decided forthwith to cancel the following paragraph (No. 3) of Clause 280 of its Tariff Book, relating to facilities for the export of fruit oversea:—" If desired, arrangements will be made for the shipment and complete disposal on the London Market of citrus fruits forwarded via Cape ports and via Lourenco Marques. The charge will be 20s. per ton (as above), plus the actual net cost to the Administration for seed freight, agents' fees, etc., in London."

Woolled Sheep and Cattle-Dipping Tanks.

Mr. J. F. McNab, Wool Expert (Orange Free State), writes:—On looking through the July number of the *Agricultural Journal* I came across a very interesting article written by Lieut.-Colonel H. Watkins-Pitchford, on " Dipping and Tick-destroying Agents." Whilst this article cannot be too highly praised from some standpoints, there are suggestions contained therein which give rise to the gravest apprehension on the part of those most keenly anxious about the development of the wool industry in South Africa. It has been proved beyond question that South Africa, given a fair chance, will produce wools equal if not superior to the bulk of Australian clips. Now in the article in question, on page 55, the following paragraph may be seen:—" Recognizing the inconvenience likely to be experienced by sheep farmers in the maintenance of two dips (one for sheep and one for larger stock), necessitating the use at times of two different dipping fluids, an endeavour was made to adopt the laboratory dip for use as a sheep dip."

I take it from the foregoing that it is meant to swim the sheep through the same dip as the cattle. If such is the case I cannot too strongly condemn it. In the first place, when cattle have been put through a dip a few times the water becomes naturally very foul from drainage, droppings, etc. For cattle this does not matter, as their covering is of no commercial value; with sheep in general their value lies in their covering. Hence it will be seen that it is a very

dangerous principle to recommend to the average farmer on account of economy. Sheep dipped properly in clean fluid of a reliable nature grow a better wool (providing that they are dipped with less than two months' wool on) than those not dipped. If, on the other hand, they are put through a foul dipping fluid the damage to the wool is very considerable, and a farmer may lose more on one clip of wool than would pay for two sheep dips ten times over. Apart from foulness on account of droppings, etc., any observant individual may notice that the water after cattle are dipped has a great number of hairs in it. Should the sheep follow the cattle through the dip they pick up these hairs, therefore inestimable damage results, as these hairs will not take the same dyes which are used for wools. When wool is intermingled with hair or kemp a wool buyer allows for from 20 to 50 per cent. reduction per pound, as it makes up into damaged cloths.

On page 76 mention is also made of dipping sheep for eighteen consecutive weeks with satisfactory results. As a promoter of good wool growing, I would consider the results anything but satisfactory. Scab may be killed with two dippings with a good reliable dip, so why should a recommendation be given for an eighteen weeks weekly dipping, seeing that apart from its being unnecessary it damages the wool to such a great extent. I cannot too strongly condemn dipping sheep in a cattle dip. I recognize the necessity for a cattle dip to destroy ticks, etc., on cattle, but a farmer must also have a different small dip for his sheep.

The Conformation of the Horse and some Defects of the Animal.

By A. Grist, Assistant Principal Veterinary Surgeon, Orange Free State.

The attitude of the horse when standing at attention should be as follows:—The head and neck are raised with fixed ears. The line of the face at an angle of about 60 degrees to the ground, and at a right angle to the neck, with the weight of the body distributed in proportion on all four legs. The fore legs should be vertical, or perhaps with a very slight slope back under the body. The point of the hock should be in a plumb-line with the buttock. It is said by some authorities that if the back line is continued to the fetlock it maintains a vertical direction; but I think if the hocks are placed in the correct position, this is not so. The neck or rein should be of fair length, longer in the saddle horse than in the draught animal, tapering neatly towards the head.

Height and Measurement.

The height of the horse is the vertical distance from the ground to the highest point of the withers, when the forelegs are vertical or nearly so, and the hocks are in a plumb-line with the buttocks.

The length of the body of the horse is the horizontal line from the front of the chest to a line dropped vertically from the point of the buttock.

Depth of chest is the vertical distance from the top of the withers to the bottom of the chest. Height at the croup: the vertical distance from the ground to the croup—highest point of the hindquarters.

The following are the measurements of Ormonde as a four-year-old and St. Simon a three-year-old:—Height at withers, 64½ inches or 16 hands ½ inch, 63¼; length of body, 61½ inches, 59½; depth from withers to brisket, 29 inches, 27¼; distance of girth place to ground, 35½ inches, 36¼; length of head, 24½ inches, 24. A racehorse is higher than he is long in the body, and the shire or heavy draught horse is longer in the body than in height.

Comparative Measurement.

In comparative measurements of height in the racehorse and draught animal the distance from the top of the withers to the brisket of the thoroughbred, when applied to the foreleg, will reach from the brisket to the bottom of the fetlock joint. In a well-bred hunter the same measurement would reach the middle of the pastern. In a heavy-weight hunter to the coronet. In an artillery gun-horse to the ground, or to put it in other words, the heavier the breed the shorter the limbs.

The comparative measurement at the croup of the horse with that at the withers shows that as a rule racehorses of the highest type are about the same height at the withers as the croup. The lower a horse

is in front, other points being equal, the rougher will be his paces for riding purposes, more especially when ridden on a level and down hill. The limit for thoroughbred in height is 16 hands 3 inches, while that of the heavy draught is 17 hands 3 inches. A useful height in this country for ride and driving work is 15 hands 1 inch. The measurements through the chest behind the shoulders vary from 16 inches (Arab) to 19½ inches in heavy-weight hunter. Careful selection of breeding, good feeding in the time of drought and winter, and healthy conditions of life have great influence in tending to increase the size of animals.

The mare as compared with the horse has a lighter neck, a broader pelvis, slacker in the loins, and is higher behind.

"ARCHBISHOP'S" MEASUREMENTS.

The following are the measurements of the thoroughbred horse "Archbishop", imported by the Government of the Orange Free State. I take these measurements as I consider him one of the most powerful and useful thoroughbreds imported for breeding general purpose horses:—Height, 15 hands 2¼ inches; forearm, 22 inches; girth, 71¼ inches; below the knee, 8¾ inches.

With regard to size the following should be remembered:—(1) The offspring of certain sires and mares are often abnormally small. (2) The first foals are often smaller than the subsequent ones. (3) The progeny of old sires are often lacking in height.

The length of the head, as a rule, is proportionate to that of the body (trunk), but it bears no fixed ratio to the length of the limbs, the proportion being 1 to 2½. The length of neck should be in proportion to the length of the forelimb, so that we find the neck of the blood-horse (thoroughbred) longer than that of the draught animal. The weight of the body should be in proportion to the size of the limbs; this applies more particularly to the saddle horse. The muscles and bone of the racehorse are smaller than that of the heavy draught horse.

If the forefeet of a number of animals of various breeds and sizes be picked up and the limb bent at the knee and lower joints, it will be found that the heel will almost in all cases touch the elbow at the same point. The cannon bone should be short in hunters and riding horses which have to carry weight, also in long-distance racehorses and steeplechasers, but this is not necessary in sprinting racehorses whose distance is five furlongs.

BONE.

The common term "bone" usually refers to the bone below the knee and hock. It varies in quality and size in different breeds. It should not be judged solely by reference to size. In the thoroughbred it is heavy and dense of structure, whilst in the underbred animal the bone is coarse, porous, and light.

It is important that the bone, especially below the knee and hock, should be large and of dense texture so that it may be able to resist a considerable amount of strain and concussion. This applies more especially to a horse which has to carry heavy weights and has to gallop on hard ground.

The measurement below the knee of a thoroughbred horse should be at least 8 inches.

The posterior line at the back of the tendons should run parallel, or nearly so, with the front line of the bone. The tendon should be hard, clean, and free from thickening.

CONFORMATION.

Head.—In the lighter classes of horses the head should appear lean. The muscles and blood-vessels should be clearly defined, covered by a fine skin. The bony prominences should be sharply marked. A fleshy large head is an indication that the animal is soft and wanting in quality and blood. The line of the forehead and nose is straight, concave, or convex. The latter, for which the name "Roman nose" is given, is ugly. The forehead should be broad; a good width between the eyes is usually a sign of intelligence. The forehead should be prominent, just above the brow-band, with well-developed muscle on each side; such is an indication that the animal has courage. The bone of the top of the head (the occipital crest) should be prominent, as it is the point of attachment for the strong ligament of the neck and important muscles. The ears should be upright, capable of active movement, fairly close set, closer at the points than at the base. The eye should be clear, with a dark pupil, fairly prominent, and the eyelids thin, with as few wrinkles as possible. The nostrils should be thin, flexible, and of ample capacity to allow of expansion. When the animal is at rest they should be partly closed. The lips should be lean and possess good power of movement.

The branches of the lower jaw should be wide apart at their angles, and the space between should be hollowed out and free from excess of tissue.

Neck.—The shape, size, setting on, and the carriage of the neck not only adds to the beauty of the animal, but materially assists in the power of speed and action. It should be of good length, comparatively thin from side to side, and carried well up in the chaser, hunter, and hack. The term "long rein" is applied to such a conformation, whilst the neck of the heavy draught animal should be shorter and thicker. This kind of conformation is a defect in the saddle horse, because it makes the forehand heavy and prematurely wears out the forelegs.

Ample length of neck well carried gives better support to the head and so relieves the hands of the rider of heavy-weight. An animal with conformation of this kind is more pliable, responds more readily to the touch of the rein, and is rendered easy of control.

The upper line or crest of the neck may be convex, straight, or concave (ewe-necked), and is longer than the lower line. There should be a slight depression in front of the withers where the neck comes out from the chest in the lighter bred horses. This dip is very faint or absent in the heavier class of horse and the muscles of the shoulder stand out prominently.

Body.—The body should be short and as deep as possible compared with its length and inclined backwards; the length of the animal should be made up with long, sloping shoulders and long quarters. The ribs should be well sprung, of good length, and inclined backwards—good depth of chest will allow for good length of shoulders. Roundness of the chest is necessary for good breathing power. A horse should be well ribbed up; if the last rib is short, flat, and little inclined to the rear, he is termed slack over the loins. There should only be space for two or three fingers between the last rib and the hip. Mares are not usually so well ribbed as geldings.

The withers should be high, sharp, and extend well back into the back, more especially in racers, hunters, and riding horses. Such withers are associated with long sloping shoulder-blades and strength

in the back and loins. In the more common bred horse the withers are usually situated low, are thick and heavy. The line of back and loins should be straight or with a slight rise to the croup. The loins should be as flat and broad as possible. The top line of the croup to the root of the tail should be convex. A straight line indicates weakness of the part. The flank should be well filled up. Hollow flanks are indications of a weak constitution. The tail should be set on high.

FORELIMB.

The term forelimb or foreleg is applied to that portion from the humerus to the foot. The thoroughbred, hunter, and riding horse require a lighter forehand than the harness horse. The shoulder-blade of the hunter and chaser should be long and oblique, not only to give speed, but to enable him to resist the jar in landing over a fence, also to prevent the jar on hard ground. That of the riding and light harness horse should be oblique and light to obtain sure-footedness. In these animals the shoulder should not be heavy at the shoulder points. That of the heavy draught horse should be heavy and may be more upright. The elbow should not be tied into the chest so as to give plenty of freedom. Though it is not imperative that a racehorse for short distances should have a powerful muscular forearm, the hunter or animal which has to carry heavy weight on the back should have well-developed muscle at this part of the anatomy. This latter also applies more particularly to the heavy draught animal.

When viewed from the side the front line of the forearm and that of the cannon bone should be almost straight.

The knee should be clean and well defined. When viewed from the front the knee should be broad, flat, and large.

Calf-knee is the term applied when there is a tendency for the knee to drop back. Such a condition is best viewed from the side. This formation is said to be a sign of weakness, as it causes undue strain to the ligament at the back of the knee, but it should not be considered a serious defect.

The overshot knee is generally due to overwork, but may be congenital.

Knee to fetlock.—The cannon should be perpendicular to the ground and should be of good width from the side view. The tendons at the back should be nearly parallel to the cannon bone, well defined, and stand out prominently from one another, with a distinct grove behind the cannon bone and between each other.

THE FETLOCK.

The chief points about this joint are: It should be flat from side to side, and when viewed from the side of the animal it should not be broad as compared with the width of the leg just below the knee. (Captain Hayes.) This joint should not be round. The lock of hair at the back of the fetlock is abundant in heavy draught horses and common half-breds, but is scanty in the blood-horse.

THE PASTERNS.

The pasterns of the thoroughbred, hunter, and saddle horse should be long and oblique; those of the heavier draught for slow work are upright and short. Where an oblique shoulder is necessary so is the sloping pastern. Both being required for fast work and hard roads,

the latter conformation, sloping pasterns, prevents concussion, so therefore is essential in the saddle horse. A horse with upright pasterns is stilty in his gait.

THE HOOF.

The horn of the wall and the sole should be thick, hard, and tough. The outside surface of the hoof should be smooth and the surface line straight. Its slope should be continued in about a straight line with the pastern. The heels should be open and strong, the bars well developed, so that the liability to corns and contractions of the heel of the foot is lessened. The sole should be convex, that is when it is placed on the ground. Feet with flat soles are predisposed to laminitis or fever in the feet. They should be of ample size; when too small they do not supply a good base of support, neither do they take sufficient grip.

THE HINDLIMB.

The chief function of the hindlimb is to propel the animal forward, though in addition it takes a share of the weight of the body. The pelvis or quarters should be long, the thigh short, distance from the stifle to the hock long; such an animal is termed " well let down ". The cannon bone should be short and the pasterns long. It is said that good length of croup and pelvis and a horizontal position indicate speed—such was the conformation of Ormonde in these regions, whilst the quarters of St. Simon were oblique. When the conformation of this region is marked by great obliquity the horse is designed to employ great force at a slow pace, while with the croup disposed horizontally he is capable of developing great speed, but fails when called upon to carry weight or cover a long course. For light carriage work such a conformation may suffice, but it is not adapted for heavy draught. (Wortley Axe.)

Horses used on the turf should have the croup and pelvis placed as near the horizontal position as possible, while the hunters, cavalry, and other horses which have to carry great weight under the saddle should neither be horizontal nor too oblique in this region, but have an intermediary position between the two, whilst the heavy draught horse should have an oblique croup and pelvis.

THE THIGH.

The thigh should be well covered with muscle, for here lies the propelling power. For speed it should be short comparatively. The direction should be forward and inclined a little outwards; the latter position is necessary for the horse to clear the body when galloping. If the thigh is inclined too far forward, the limb is placed too far under the body, and the movement is impeded. Viewed from behind, the thigh should be broad and furnished with ample well-developed muscle; insufficient development forms a gap between the hindlegs; a horse with such a conformation is said to be split up. The direction of the stifle should be inclined outwards, sufficiently to allow the horse to clear the abdomen during movement. For speed it is necessary that the second thigh should be lengthy to give the horse a long stride. The gaskin should be broad viewed from the side, and the muscles well developed.

THE HOCKS.

The hocks should be large and strong, the outline clean and well defined. They should be placed directly under the centre of gravity

and well let down. The legs from the point of the hocks should incline a little under the body. If the legs incline much forward (sickle hocks) the formation is weakened, because the strain is increased on the ligaments and tendons situated in that region, by the angle being more bent. Undue concussion results from a hock with a straight conformation, and such joints are inclined to develop bog-spavin and thoroughpin, whilst an overbent or sickle hock frequently springs curbs. The hocks when viewed from the side should be wide. When viewed from behind the cap of the hocks should be straight. They should not be turned out, neither should they be turned in (cow-hocked). The bone immediately below the hock should be large; when it is small in this region the term "tied in below the hock" is applied.

Defects in Riding and Light Draught Work Horses.

An animal without a fair share of blood is lacking in courage and is sluggish in his work. A large coarse head, small sunken eye, pig eye, a short thick neck in the saddle horse. Low withers, upright shoulders in the saddle horse, he is inclined to stumble and does not give comfort to the rider. Want of depth and width of the chest; ribs not sufficiently sprung, flat sided; long, weak, or hollow back, the formation is weak and will not carry weight; narrow slack loin; too much space between the last rib and hip. Forelegs very close together, forelegs which are not straight; tied in below the knee, calf-kneed. Short upright pasterns in a riding horse there is want of spring in the limbs; a horse with such a conformation is inclined to jar the rider. Turned out toes are liable to brush, turned in toes animal liable to stumble. Flat feet and low heels are predisposed to laminitis—inflammation of the sensitive laminar. Upright feet, termed blocky, with contracted heels, predisposed to naricular disease; small feet, brittle horn. Very bent hocks, very straight hocks, action which is not true and straight, such as crossing of the forelegs, brushing, striking, forging, etc.

The Show Season in Natal.

MARITZBURG AND DURBAN.

After a run of practically five months the South African agricultural show season has now come to an end, the last shows of importance in the series being those of the Royal Agricultural Society of Natal and the Durban and Coast Society of Agriculture and Industry. Spread over a considerable portion of the year, and held in all the more important centres of the country, the agricultural shows of South Africa represent a wide diversity of agricultural conditions—from viticulture and ostrich farming on the one hand to sugar and tea, tropical fruits, and wattle bark on the other hand. It is only necessary to run through the prize lists or the catalogues of the various shows to realize the great range of farming industries which South Africa enjoys and to realize something of the agricultural possibilities of the country.

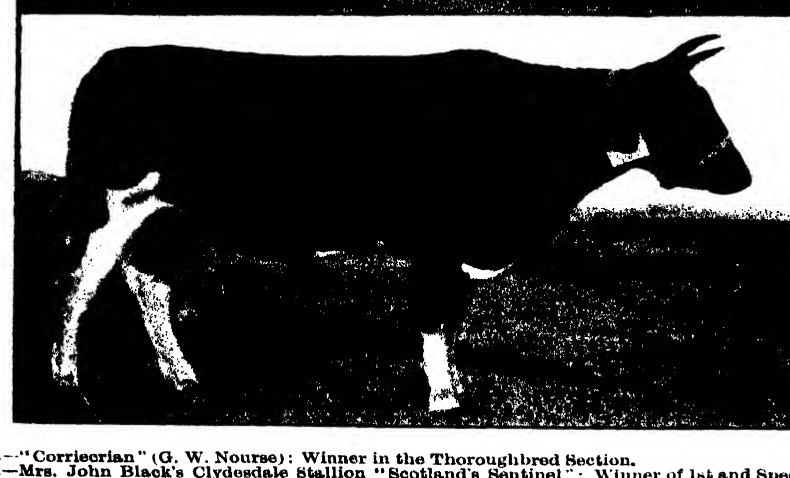
Judged by the standard of former years—that is, since the incidence of East Coast fever forced the exclusion of the cattle section—it is hardly too much to say that the Maritzburg show was an unqualified success; and what added even more to its attractions was the fact that it was possible to include a cattle section this year. True, the entries could only be drawn from Maritzburg and the immediate neighbourhood, and the stock could not therefore be expected to be of too exacting a standard or the number of entries considerable, but at the same time the mere presence of cattle added that quality to the whole show which has been missing for years. Next year, doubtless, it will be possible to draw cattle entries from a wider radius. In every other direction the sections of the show showed some improvement at least upon former years, in some cases the improvement being quite marked. The horse classes were strong practically throughout, and with few exceptions competition was fairly keen. Sheep were represented chiefly by Merinos and Shropshires. In the former class the bulk of the competition lay between Mr. G. E. Blaker, of Estcourt, and Mr. R. J. Speirs, of Howick Rail; other competitors in this class were Messrs. C. J. King, of Nottingham Road, R. Garland, Mooi River, and W. Haines, Estcourt. The Shropshire Down class was a stronger one than the Merinos, and there was more competition. Messrs. P. D. Simmons (Mooi River), R. Garland (Mooi River), and G. Hutchinson (Balgowan) were the chief exhibitors. Other Down classes were very poorly represented indeed, and the competition in the long-wool, cross-bred, and fat sheep classes was not very keen. Among the stock sections of the show one of the most notable was that devoted to pigs. Here some fine animals were shown and the competition was keen. The principal classes were those for Yorkshire Whites and Berkshires. In the produce classes there was very little to complain of, and some very good quality was shown. This applies especially to mealies of which there was one of the finest shows, if not the finest, ever seen in Maritzburg. Twelve

classes were devoted to this grain. The standard of quality was high and the competition very keen. Each year sees a notable improvement in the classes devoted to this grain. There was a good show of other grains, and as usual the root classes were good. The machinery section was a striking one and quite an improvement on those of previous years, even though the standard has generally been high. This year, of course, is not comparable with last year, as in 1910 several of the leading agricultural implement firms withheld their exhibits. This year, however, the representation was very good, apart from the excellent show of machines and implements which each firm managed to stall. A striking feature of the machinery sections of both the Maritzburg and Durban shows nowadays is the increasing number of oil engines and pumping apparatus shown. As regards oil engines, the variety of makes and styles, not to mention the wide range of prices, is gradually increasing, and the farmer who wishes to instal mechanical power for his stationary farm work has now little reason for not doing so. So far as Natal is concerned one would like to see more attention given to the needs of the Province in regard to motor tractors, but the difficulty is that the oversea manufacturer fails to give sufficient attention to the peculiar needs of the country.

Both the Natal Poultry Club and the Pietermaritzburg Kennel Club held their exhibitions in conjunction with that of the Royal Agricultural Society, and both achieved very successful results; the show of poultry especially constituting a marked improvement upon last year.

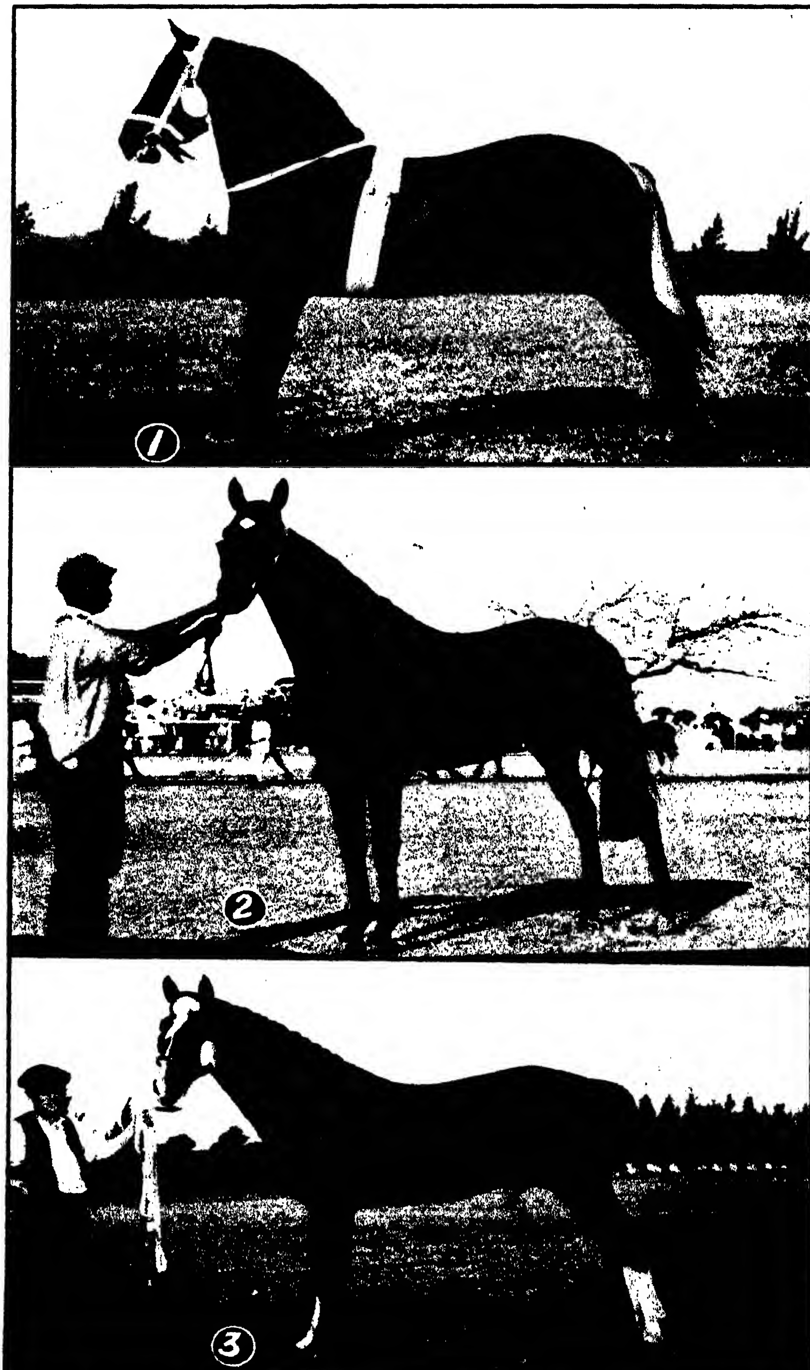
Another most successful show was that held under the auspices of the Durban and Coast Society of Agriculture and Industry. The attendance was splendid, since the show was held as usual in the height of the Durban "season", when there are large numbers of visitors from the other Provinces. Here again there was improvement, on the whole, on the previous year's show, but the improvement was not as evident in all the sections as it was in the case of the Maritzburg show. The horse section was a fine one as compared with previous years, and considerably outclassed that at Maritzburg, especially in the thoroughbred classes. The open class for mares was good, but there was not very much competition in the hackney classes, although there were some fine animals exhibited. Cleveland Bays and Yorkshire coach horses were not as good as they might have been, both as regards numbers of entries and quality of animals. In the case of cart horses, however, there was a marked improvement on last year. Both at Maritzburg and Durban the show of donkeys and mules was poor. Unlike Maritzburg, Durban had no cattle section, which, in a comparison between the two shows, rather detracted from the general attractiveness of the coast show. The sheep section was not as good as it might have been, and the Merino classes were a little disappointing as regards the quality of the animals. The best animals in these classes were the Wanganellas. On the other hand there was quite a nice show of Shropshires with a keen competition in most of the classes. As at Maritzburg the other Down classes met with a very poor response. Long-wools were good; and in the cross-breds there were two strong classes—ewes and lambs. There was a marked improvement in fat sheep as compared with 1910, both as regards numbers and quality of the animals. There was a good show of goats, but with no competition, Mr. J. G. Bester having practically everything his own way. The display of pigs was not as good as that of the

The Pietermaritzburg Show.



1.—"Corriecrian" (G. W. Nourse): Winner in the Thoroughbred Section.
2.—Mrs. John Black's Clydesdale Stallion "Scotland's Sentinel": Winner of 1st and Special Prizes in the Cart Entires.
3.—"Melba" (Fred. Harris): 2-year-old Friesland Cow—1st Prize in Section for South African Bred Heifers, 1 to 2 years old.

The Durban Show.



1.—"Morston Sunset" (W. G. Westgate): Special in Cart Horse Section, Stallions 3 years and over.
2.—"Ace of Spades" (A. K. Murray): Winner of 1st in Class Thoroughbred Stallions 3 years and over, standing at stud fee not exceeding £5; and 1st in Class Thoroughbred Stallions 3 years and over, South African bred.
3.—"Count Clio" (Vaughan and Lane): Winner of 1st, Special, and Championship for Hackney Stallions 3 years and over.

Maritzburg show, taking it on the whole, but there was a better exhibition of Berkshires than was to be seen at the City. In both the boar and sow classes there were some very fine animals. In the bacon pig and porker classes competition was very keen. The machinery section was a fine one and very representative—perhaps a little more so than was the case at Maritzburg.

The Durban and Coast Poultry Club and the Natal Kennel Club held their annual exhibitions in conjunction with the agricultural show with successful results.

Some mention should be made of the improvements which have been carried out by the society in their grounds. These constitute, principally, a fine new hall, well built of brick, containing loose boxes for horses, which was this year devoted to the housing of the thoroughbred stallions, and a large new hall erected for the housing of the poultry section, the old hall being this year utilized for the large Union Government exhibit. Both at Durban and at Maritzburg the grounds have been improved in several directions, particularly at the latter centre, where the outdoor exhibits are now more conveniently arranged than they were in former years.

The Mayers Alleged Preventive for Lamziekte

REPORT ON THE TESTS.

For the purpose of testing the alleged preventive for lamziekte, offered to the Government by Mr. Mayers, of Grootfontein, 100 half-bred Friesland cows were selected from the herd of Mr. Leo, Smithskraal, Orange Free State, on whose farm the test was to be performed. Mr. Mayers arrived on the farm on the 2nd February, 1911, and informed me that the treatment consisted of a double inoculation. The first inoculation was done by him on the following day, 3rd February, 1911. Animals treated were branded on the right hip with the figure 4; 100 cows in all were inoculated. Ten days later, 13th February, 1911, these animals received the second inoculation, and portion of the brush was cut off the tail of each animal for identification.

The animals were then allowed to run with the other milk cattle and were placed in the river camp, this being the most healthy camp on the farm.

On the 28th February, 1911, eighteen of these cows were placed with the Government grazing lot in the middle camp, and with these latter animals were changed to the west camp on the 30th March, 1911.

On the 1st April, 1911, the balance of the treated lot, along with all Mr. Leo's milk cows, were changed to the west camp. The cases of lamziekte among the treated animals occurred after the animals had been to the west camp.

The following is a list of animals treated by Mr. Mayers which contracted the disease, with particulars noted after the first symptoms were observed :—

1. Black and white cow noticed stiff 23rd April, 1911. Became worse on following days; lamziekte diagnosed. Commenced to recover on 26th April, 1911, and was normal on 29th April.

2. Cow, stiff in front 25th April, 1911, not diagnostic. Recovered and was normal 28th April, 1911.

3. Black and white cow, with 4-months calf at foot. Off feed, milk supply diminished 4th May, 1911. Stiff in movements, noticed more particularly after walking some distance. Lamziekte diagnosed; recovered.

4. Black and white spotted cow (from lot with Government grazing lot). Lamziekte diagnosed from stiffness in movements on 25th May, 1911. Got gradually worse, and was unable to rise on 3rd June, 1911. Stretched out on side on morning of 4th June, 1911. Was propped on her brisket with stuffed sacks, fed, and watered daily. Refused food and water from 6th June, 1911. Died morning of 17th June, 1911.

POST-MORTEM REPORT No. 45.

			Temperature. Morning.	Temperature. Evening.
7th June, 1911	..	..	100.8	101.8
8th June, 1911	..	..	98.4	101.
9th June, 1911	..	..	98.8	100.4
10th June, 1911	..	..	98.0	100.2
11th June, 1911	..	..	98.4	101.4
12th June, 1911	..	..	97.	100.4
13th June, 1911	..	..	98.6	100.8
14th June, 1911	..	..	97.6	—
15th June, 1911	..	..	—	—
16th June, 1911	..	..	—	—
17th June, 1911	..	..	97.0	97.0

5. Black cow (from lot with Government grazing lot). Lamziekte diagnosed from characteristic stiffness 30th May, 1911. Seen on 2nd June, 1911, to be walking better. Slowly recovered.

6. Black and white cow. Noticed sick morning of 29th May, 1911. Lamziekte diagnosed. Unable to rise afternoon of 29th May, 1911. Symptoms of paralysis of hindquarters shown 30th May, 1911. Died during night.

POST-MORTEM REPORT No 39.

			Temperature. Morning.	Temperature. Evening.
29th May, 1911	..	..	98.4	101.
30th May, 1911	..	..	96.8	101.4.

7. Black and white cow. Noticed sick 29th May, 1911. Lamziekte diagnosed. Unable to rise 30th May, 1911. Symptoms of paralysis of hindquarters and tongue. Profuse salivation. Died during night.

POST-MORTEM REPORT No. 40.

			Temperature. Morning.	Temperature. Evening.
30th May, 1911	..	..	98.6.	102.4.

8. Black and white cow. Diagnosed "affected with lamziekte from characteristic gait" on 1st June, 1911. Unable to rise 4th June, 1911. Symptoms of paralysis of hindquarters. Died 9th June, 1911.

POST-MORTEM REPORT No. 44.

			Temperature. Morning.	Temperature. Evening.
7th June, 1911	..	..	99.8.	100.
8th June, 1911	..	..	99.0	100.6

9. Black and white cow. Noticed sick 2nd June, 1911. Diagnosis of lamziekte made. Still grazing and rising with difficulty 4th June, 1911. Very stiff in movements. Died during afternoon of 10th June, 1911, during my absence from the farm, and was too decomposed for post-mortem purposes on my return on 11th June, 1911.

	Temperature. Morning.	Evening.
7th June, 1911	101.4.	99.8
8th June, 1911	—	100.2
9th June, 1911	—	99.6.
10th June, 1911	97.4.	—

From the foregoing facts it will be seen that on the date of writing the death-rate among the treated animals is 5 per cent. Comparing this with deaths occurring among non-treated (control) animals grazing under similar conditions we have the following data :—

Controls on the farm from 13th February, 1911—438. Deaths occurred as follows from lamziekte :—

24th February, 1911, one six-months-old heifer.
25th February, 1911, one year-old heifer.
3rd March, 1911, one seven months' old bull.
22nd April, 1911, two cows.
26th April, 1911, one cow.
1st May, 1911, one heifer.
20th May, 1911, one cow.
23rd May, 1911, one cow.
1st June, 1911, one cow.
4th June, 1911, one cow.
Total, eleven ; i.e. deaths from lamziekte in controls 2.5 per cent.

It will be seen from the foregoing that although the test has only been in operation for a period of less than five months, deaths among the treated animals from lamziekte have occurred to the extent of 3 per cent. more than was stipulated in the agreement between the Government and Mr. Mayers, and also that the treatment has absolutely no protective value against this disease.

A microscopic examination was made in each case of blood taken from the animal previous to death, but in each case the result was negative.

I attach herewith reports of post-mortems made on four of these treated animals. I thought it advisable to have my diagnosis confirmed in each case, so I asked two gentlemen who had resided for a considerable period in this district, and were well acquainted with lamziekte, to do so.

I attach a certificate signed by these two gentlemen and myself to the effect that the five treated animals referred to in this report died as a result of lamziekte.

D. T. MITCHELL.

Smithskraal, Orange Free State,
18th June, 1911.

We, the undersigned, hereby certify that we have seen the five animals treated by Mr. Mayers, referred to in the foregoing report, during the time that they were sick, and we are of the opinion that the animals were suffering from lamziekte.

We further certify that this disease was the cause of death.

K. LEO.
D. T. MITCHELL.
J. C. KOK.

Experiment Camp,
Smithskraal, Orange Free State, 19th June, 1911.

Experiments with Soya Beans in 1910-11.

By E. R. Sawer, Director, Division of Agriculture, Natal.

The vital problem of arable farming in South Africa is to find a restorative crop for profitable growth in rotation with maize. This need for a staple legume, the recent general adoption of soya bean oil for numerous industrial purposes, and the establishment of soap, candle, and explosive factories in the heart of our principal plantation areas, has stimulated much local interest in the soya bean. The results of tests at the Cedara Experiment Farm, extending over a period of six years, have further shown that this plant, recently introduced to Europe as a hitherto unknown and valuable source of vegetable oil, finds favourable conditions for development in the climate and soils of Natal.* It was consequently determined last year to engage the interest of as many farmers as possible in an extension of the field experiments as a prior step to the establishment of the crop as a new staple. The scheme has fortunately enjoyed the hearty support of the Agricultural Union, the Maize Growers' Co-operative Association, and Messrs. Lever Bros., Ltd., by whose assistance seed for the planting of from 3 to 5 acre plots has been distributed to over three hundred farmers in all parts of the Union, together with descriptive bulletins and printed report forms. It is, therefore, the more regrettable that this undertaking should have coincided with a season of widespread drought and generally unfavourable conditions, which have seriously militated against the objects in view, and may have discouraged a minority of planters. Of the fifty reports which have at present come to hand, twenty-six indicate exceptionally dry weather or absolute drought during the months of January and February, which correspond with the principal growing period of the crop. Five reporters have suffered partial or total loss of the crop from hail, while abnormal rainfall at the close of the season has prevented harvesting in three cases. Only thirteen planters report fair or favourable conditions, while numerous recipients of seed have refrained from planting at all on the score of drought. In such circumstances it is encouraging to note a general determination to give a further and fair trial to the crop in a season of more normal conditions. In the meantime the following reports compiled at the different experiment farms in Natal afford some additional guidance to that deduced from earlier results, and it may be noted that the centres in question have been relatively fortunate in the matter of rainfall, the returns reflecting considerably higher precipitation than in the majority of districts. The soya bean crop at the Weenen Station, however, was seriously checked and damaged by hail on no

* Full details of the earlier experiments, with instructions for cultivation, were published by the writer in Bulletin No. 2, 1910—"The Soya Bean"—and in the "Cedara Memoirs", Vol. II, Report X, 1911.

less than three occasions, the early varieties suffering most, as the hail damaged the pods before the seed had matured.

The problems in connection with the cultivation of this crop for which solutions have been sought in our experiments include a determination of the behaviour of numerous varieties in different conditions of soil and climate, the most suitable combinations of fertilizers for different soils, the best time and distance for planting the crop, and the effect of different systems of cultivation upon the oil content which determines the value of the crop. Variety and manure tests have been made at all three farms during the past season, a time of planting test at Winkle Spruit, and a distance of planting test at Weenen.

VARIETY EXPERIMENTS.

An outstanding feature of the results of our experiments has been the marked modification of the different types of soya bean in response to the altered conditions of soil and climate, and too much stress cannot be laid upon the necessity for allowing any variety to reach equilibrium before being approved or condemned. Bulletin No. 98 of the Bureau of Plant Industry, United States Department of Agriculture, throws much light on the variability of this crop, and the warning therein issued is applicable to local findings. "The cultural varieties to be described differ in colour and size of seed, in height and habit of plant, and in earliness and lateness of maturing, all these characters, except the colour of the seed, varying greatly with climate and soil. . . . In the case of imported seed, where the habit of the parent plant and the conditions under which it grew are generally unknown, it is naturally difficult to tell when equilibrium has been reached. It is certain that many of the imported forms are much smaller in size and of earlier maturity the first year than they are the second year. Some have been discarded after one year's trial as 'too dwarf to have any value here', when subsequent trial has shown them to be decidedly large and prolific. Some have not shown their true value till the third year, and perhaps not wholly even then. In some of these importations the variation year by year has been so striking as to arouse the suspicion that the plants are not the same as those of the preceding crop." An extreme example is quoted in the above-mentioned bulletin. A yellow soya bean was received from France and first grown in 1902. In that year it reached a height of 12 to 16 inches, and ripened in ninety-five days, being classed as a "dwarf early yellow". In 1903 it reached 24 to 28 inches in height and required 120 days to reach maturity, and was therefore called a "medium yellow". In 1905 the average height was 30 to 36 inches, and 130 to 140 days were needed to reach the mature condition, thus placing it with the "medium late yellow", where it remains.

A similar case was observed at Cedara, when an early green (Guelph) type planted in 1905 grew to the height of 24 inches and matured in 100 days; replanted, the same type in 1908 grew to the height of 36 inches, and took 153 days to come to maturity. It will thus appear that no variety should be approved or condemned on the results of a single season's trials, but should be allowed by replanting to reach its equilibrium in the new conditions.

Considerable variation is also noticed in the size of the seeds of a given variety. As might be supposed, the pods and seeds produced

on plants dwarfed by drought, thick-planting, etc., are generally smaller than those produced on normal plants. In a given season the average size of the seeds may be markedly different from that of the preceding or succeeding season. The seeds from pods produced later in the season are very likely to be noticeably reduced in size.

In the absence of any sufficient supplies of local and acclimatized seed for general distribution, farmers' experiments were necessarily conducted with imported Manchurial seed of low standard. With a view to securing uniformity of conditions, the variety experiments at the Government farms were similarly conducted with freshly imported seed, local and acclimatized seed being only employed for larger revenual crops. The following table reflects the comparative returns from our three different centres.

SOYA BEANS.—RESULTS OF VARIETY EXPERIMENTS, 1910–11.

Name of Variety.	Cedara.						Winkle Spruit.			Weenen.			Average.	
	Date Sown.	Date Harvested.	Height.	Average No. of Pods per Plant.	Average No. of Beans per Pod.	Yield of Beans per Acre.	Date Sown.	Date Harvested.	Yield of Beans per Acre.	Date Sown.	Date Harvested.	Yield of Beans per Acre.		
			in.			lb.			lb.			lb.	lb.	oz.
Austin	5/12/10	26/4/11	.	.	.	729	.	.	.	.	.	.	.	
Austin	21/10/10	28/4/11	10·8	44·0	1·7	84	.	.	.	.	.	.	.	
Black Beauty	21/10/10	17/2/11	11·1	21·6	1·30	490	20/12/10	10/4/11	568	10/11/10	28/2/11	930	662	10⅔
Brownie	21/10/10	28/4/11	30·2	59·3	1·89	1162	20/12/10	10/4/11	165	11/11/10	1/4/11	780	702	5⅓
Buckshot	21/10/10	3/2/11	10·0	9·5	1·54	70	.	.	.	10/11/10	4/2/11	200	135	
Butterball	5/12/10	20/4/11	.	.	.	202	.	.	.	.	.	.	.	
Chinese White	22/10/10	28/4/11	32·7	38·0	1·53	522	.	.	.	11/11/10	13/4/11	1300	911	
Early Brown	21/10/10	17/2/11	11·8	14·2	2·10	329	20/12/10	10/4/11	642	9/11/10	27/2/11	890	620	5⅓
Early Black Beauty	.	.	.	.	.	.	20/12/10	10/4/11	330	.	.	.	.	
Ebony	21/10/10	{17/2/11, 28/2/11}	21·9	52·9	1·68	903	20/12/10	30/3/11	406	9/11/10	28/2/11	850	719	10⅔
Fairchild	21/10/10	{17/2/11, 23/2/11, 28/2/11}	17·2	29·5	1·85	525	20/12/10	30/3/11	204	10/11/10	28/2/11	1030	586	5⅓
Flat King	5/12/10	20/4/11	.	.	.	900	.	.	.	.	.	.	.	
Haberlandt	5/12/10	24/4/11	.	.	.	2000	20/12/10	10/4/11	770	9/11/10	28/3/11	880	1216	10⅔
Haberlandt	21/10/10	11/4/11	35·0	83·8	1·75	800	.	.	.	.	.	.	.	
Han Kow	21/10/10	28/2/11	13·2	46·9	1·77	490	20/12/10	10/4/11	581	9/11/10	7/4/11	960	677	

Hollybrook........	21/10/10	28/4/11	15·0	45·6	1·94	343	20/12/10	10/4/11	806	10/11/10	28/3/11	530	559	10⅔
Hollybrook........	5/12/10	26/4/11	.	.	.	364	.	.	.	.	.	.	.	
Hong-Kong	21/10/10	17/2/11	23·7	68·2	2·14	161	20/12/10	10/4/11	458	10/11/10	27/2/11	820	479	10⅔
Hosking..........	.	.	.	.	.	.	20/12/10	10/4/11	346	.	.	.	.	
Ito San..........	21/10/10	17/2/11	13·6	34·8	1·75	119	20/12/10	10/4/11	348	9/11/10	27/2/11	930	465	10⅔
Jet..............	21/10/10	{17/2/11, 23/2/11, 28/2/11}	22·8	28·8	2·12	616	20/12/10	30/3/11	644	9/11/10	28/2/11	1190	816	10⅔
Kingston.........	21/10/10	17/2/11	11·5	29·1	1·96	210	20/12/10	10/4/11	550	10/11/10	28/2/11	660	473	5⅓
Mammoth Yellow..	21/10/10	9/4/11	33·5	41·3	1·76	609	20/12/10	19/4/11	1191	9/11/10	13/4/11	1400	1066	10⅔
Merko............	21/10/10	11/4/11	26·2	59·4	1·70	1022	20/12/10	10/4/11	198	9/11/10	7/4/11	970	730	
Meyer............	5/12/10	26/4/11	35·4	45·2	2·60	1552	.	.	.	.	.	.	.	
Natal White......	.	.	.	.	.	.	.	.	.	11/11/10	13/4/11	1330	.	
Okute............	21/10/10	28/2/11	21·1	33·7	1·81	609	20/12/10	10/4/11	568	10/11/10	5/4/11	700	625	10⅔
Parson's Select....	21/10/10	23/2/11	10·0	27·5	1·69	210	20/12/10	10/4/11	440	9/11/10	7/4/11	860	503	5⅓
Peking...........	5/12/10	20/4/11	.	.	.	500	.	.	.	.	.	.	.	
Sakura...........	7/10/10	{16/2/11, 24/2/11}	14·4	18·0	2·00	521	.	.	.	11/11/10	28/2/11	650	585	8
Sherwood.........	21/10/10	11/4/11	27·2	40·1	1·91	721	20/12/10	10/4/11	806	10/11/10	5/4/11	880	802	5⅓
Sutton's	21/10/10	17/2/11	14·8	26·0	1·68	192	.	.	.	11/11/10	1/3/11	660	426	
Taha.............	5/12/10	24/4/11	.	.	.	675	.	.	.	.	.	.	.	
Tashing..........	21/10/10	17/2/11	14·5	30·4	1·83	266	.	.	.	10/11/10	27/2/11	850	558	
Wilson...........	21/10/10	23/3/11	25·1	80·1	1·80	987	20/12/10	10/4/11	385	10/11/10	28/3/11	1100	824	
AVERAGE OF ALL VARIETIES.....	.	.	.	.	.	590	.	.	520	.	.	890		

Weather.—Climatic conditions were on the whole favourable at all three stations, with the exception of the incidence of hail on three occasions at Weenen. The last storm did considerable damage to the crop, which was then in pod. At Cedara, moreover, the early planting subjected the crop to a somewhat lower average temperature in its early stages than is conducive to maximum returns. As, however, the experiments covered 30 acres in all, the choice of planting season was necessarily determined by the exigencies of farm work later in the season. The maximum and minimum temperatures for each month during growth, and rainfall for the same period for the three stations, are given below:—

PERIOD OF GROWTH.

	Cedara.			Winkle Spruit.			Weenen.		
	Max.	Min.	Rain.	Max.	Min.	Rain.	Max.	Min.	Rain.
1910.			Inches.			Inches.			Inches.
October	91	34	4·55	.	.	.	.	.	.
November ...	90	36	2·63	85	44	4·60	95	46	1·42
December ...	94	43	5·88	89	55	6·26	96	47	4·51
1911.									
January	94	47	3·69	91	57	2·73	95	55	4·79
February ...	92	47	5·32	88	52	10·51	97	52	5·45
March	89	42	4·80	94	59	8·60	90	49	5·71
April	82	34	1·66	.	.	.	.	.	.
TOTAL RAINFALL			28·53			32·70			21·88

Soil.—At Cedara, except in the case of eight varieties, of which only a few seeds were secured, and which were consequently grown in very small plots in the garden, all the experiments were conducted on dry hill soil, west of the main avenue. This is a typical Cedara soil, light, easy to work, naturally poor, but much improved by seven years' systematic cultivation and manuring. It holds soil moisture tolerably well, forming a natural mulch of powdery dust during dry weather.

At Winkle Spruit the soils available for the experiment were of a very light, sandy character, containing, however, a fair percentage of lime, and easily worked. In this situation, despite wind-breaks of sugar-cane, drifting sand had a somewhat damaging effect on the growth of the crop.

At Weenen good alluvial soil with a fair percentage of potash and lime furnished relatively favourable conditions for the growth of the crop.

Manuring.—At Cedara the variety plots received a uniform dressing of 300 lb. high grade (37 per cent.) superphosphate, applied in the drills with the seed. The manure experiment has shown, however, in no uncertain manner, that this was not the most profitable application that could have been made, the use of potash being strongly indicated. The small plots in the garden mentioned above received kraal manure and 450 lb. of basic slag per acre.

At Winkle Spruit an application of fertilizers in different combinations to the earlier established manure plots, had had an extraordinarily deterrent effect on germination and subsequent growth,

owing to some undetermined reaction, and it was consequently decided to establish the variety plots without fertilizers.

At Weenen the plots received 200 lb. high grade superphosphate and 120 lb. of muriate of potash, given in the drills with the seed.

Planting.—At Cedara, owing to the anticipated rush of work entailed by bringing an extended area under cultivation this season, it was found necessary to commence planting operations somewhat earlier than the period which had previously been found to give the most satisfactory results, i.e. mid-November. This should be borne in mind, therefore, when considering the results of the crop. The minimum width at which the crop could be sown with the maize planter being 3 feet 4 inches, it was decided to employ other methods. Accordingly, the land was rolled and marked out with lines 30 inches wide, in which fertilizers were distributed by hand; the seed was then sown with a Planet Junior drill at the rate of 29 pounds per acre for Chinese White and Sakura. In the variety experiment this figure does not apply, as the weight sown varied with the size of the seed. Some varieties differ so greatly from others in this respect, e.g. Ebony and Han Kow, that double as much seed is required in some cases. The land was again rolled with the heavy Cambridge roller after the seed was sown.

At Winkle Spruit and Weenen the crop was planted in drills by hand.

Cultivation.—At Cedara, after planting, the land was continually stirred every few days with the anti-clog weeder as soon as the beans had made their appearance above ground. This operation was continued till the young plants had acquired the second pair of leaves, no damage being done to the crop by the implement. Subsequently inter-row cultivation was continued, the following implements being used in the order named:—Peg-tooth scuffler, broad-tined scuffler, shovel scuffler, and then one with flat knives, which did very good work. The crop was weeded once by hand. In spite of this constant cultivation, considerable damage was done by grass and weeds.

At Winkle Spruit and Weenen the plots were hand-weeded four times during growth.

Harvesting.—At Cedara part of the revenual crops were harvested for silage. This was done whilst the beans were still green in the pod. and before the crop had become too weedy. Reaping was performed satisfactorily with the Daisy Self-rake Reaper, laying the beans off in bundles, which were immediately carted to the silo. The stems of the soya bean become very hard and woody as maturity approaches, and it was found necessary to use the serrated knives for the reaper, with the cutter bar set as high as possible without leaving any pods on the stubble. Even this was found severe on the machine, and made it impossible to harvest the ripe beans in this manner. They were, therefore, pulled by hand and laid in heaps to dry prior to threshing.

At Winkle Spruit and Weenen the variety plots were similarly harvested by hand.

Observations on Varieties.—When reporting the above and associated results on the experiments at Cedara, the farm manager, Mr. W. C. Mitchell, contributed the following valuable notes, which are the result of very careful study of the crop at all stages.

"Experiments covered 30 acres in all, made up as follows:—

"Plot A1, 6 acres.—Chinese White variety, grown from Cedara-raised seed.

"Plot A2, 6 acres.—Mammoth Yellow variety, grown from seed raised last season at the Nel's Rust estate.

"Plot A3, 6 acres.—Sakura variety, grown from imported seed.

"Plot A4, 6 acres.—Testing 22 varieties.

"Plot A5, 6 acres.—Devoted to an experiment with manures.

"While the bulk of Plots A1 and A2 were harvested for silage, a few lines in each were left to mature a crop of grain. These were duly harvested, and yielded as follows:—

"A1. Chinese White (seed produced on Cedara the previous season), 522 pounds per acre.

"A2. Mammoth Yellow (seed produced at Nel's Rust the previous season), 436 pounds per acre.

"A description of these two varieties will be found under Plot A4.

"A3. Six acres sown with Sakura variety, imported seed. This is one of the standard varieties for the expression of oil. Belongs to the yellow type with hilum varying in colour from yellow to dark brown. Beans are fairly round and plump, but this is hardly a suitable variety for general cultivation in Natal whilst it retains its present dwarf type, which renders it particularly liable to damage from weeds. Takes four and a half months to mature, and produced only 521 pounds dry beans per acre.

"A4. This was devoted entirely to a test of varieties, many of which were under trial for the first time in South Africa, and although it is impossible to condemn or recommend any variety from the results of the first season's planting from imported seed, there is no doubt that much valuable light has been thrown on the question of variety.

"At the outset it must be stated that the results are somewhat disappointing as regards yield in most of the varieties, but having in mind the great improvement which is sometimes seen in soya beans after growing same for two or three seasons in a fresh climate, and when equilibrium has been reached, it is worth while giving all the varieties another trial.

"One particularly pleasing feature of this test is the striking improvement in size of seed seen in nearly every sample reaped when compared with the original.

"Dividing the varieties under trial into the usual colour groups, they appear as follows:—

"1. Black seeded.—Ebony, Kingston, Fairchild, Jet, Wilson, Han Kow, Black Beauty, Buckshot, Peking, Flat King.

"2. Brown Seeded.—Hong-Kong, Brownie, Early Brown.

"3. Green Seeded.—Parson's Select, Tashing.

"4. Greenish-yellow Seeded.—Austin, Okute, Haberlandt.

"5. Yellow Seeded.—Ito San, Sakura, Sherwood. Butterball, Merko, Sutton's, Chinese White, Hollybrook, Yellow Mammoth.

"6. Mottled Seeded.—Taha, Meyer.

"In the above a few varieties are included which were grown on very small areas in the garden owing to lack of seed.

"The following descriptive notes of the several varieties have been compiled. They are taken, as in the table, in alphabetical order, to permit of easy reference.

"*Austin*.—A good, medium-sized bean, nearly round, plump. Considerable variation occurs in colour between the original seed and the resulting crop, the former being of a decidedly greenish shade, whilst the latter contains a big percentage of yellow beans—quite 60

per cent.—and the remainder are of a much paler green than the original. This may be considered a more promising variety than the actual yield, as shown in the table, indicates, as defective germination of the seed resulted in a very poor stand of plants. The height of the crop, however, is against it, as weeds are much more likely to dominate and injure the dwarf-growing types.

"*Black Beauty.*—A jet black bean, which shows immense improvement in the new crop when compared with the sample of original seed, being 50 per cent. larger. Its yield, however, is not heavy, and it is of a dwarf type, consequently not so desirable as some others. The beans are somewhat similar to Buckshot, but not quite so large, whilst the crop takes some fourteen days longer to mature.

"*Brownie.*—One of the most promising varieties cultivated during the past season. Shows considerable improvement of type. Original seed is of a dull brown colour, with light-coloured hilum, and considerable bloom, much adulterated with white and green seeds. Crop harvested is of a very nice quality, and beans are larger than the original seed. Bear very little bloom, but otherwise are similar. Plants average 30 inches in height, which renders them very suitable as a general-purpose bean, either for fodder or grain. Yield was the highest of any variety in the larger plots, viz., 1162 pounds per acre.

"*Buckshot.*—A very early black bean of dwarf habit and poor yield. Beans are large, oblong, and slightly flattened. Unsuitable at present for cultivation in Natal.

"*Butterball.*—A very fine bean of the yellow type. Only a small quantity of seed was available and the hundred and thirty-fifth part of an acre only was sown, which yielded very badly. However, a further trial should be given this year as sufficient seed has been obtained to sow one-twentieth part of an acre. The beans are nearly round in shape, of a pale yellow colour. New crop exhibits a slight tendency to acquire a wrinkled skin; they are liable to break easily in the thresher, which should preferably be of the beater type.

"*Chinese White.*—Over twelve acres have been seeded with this bean at Cedara during the past season, and although returning a very poor yield of grain it has certainly much to recommend it for fodder purposes. In appearance, both the bean and the crop are very similar to Mammoth Yellow, but it hardly yields as well. Seeds are of a pale yellow colour, with light brown hilum. Nearly round, medium size, full and plump. Part of the crop was ensiled, mixed with the Mammoth Yellow variety, producing a very fine silage at the rate of five tons per acre.

"*Early Brown.*—Dark reddish brown in colour, covered with a greyish bloom, fairly plump. Nearly round in lateral view, but somewhat flattened. Sample adulterated with yellow and light green coloured beans. Crop reaped compares unfavourably with the original seed, colour of bean is lighter, and seems to have been considerably damaged by the wet weather prevailing at time of harvesting. Much the same size as the original seed.

"*Ebony.*—Jet black. Original seed heavily covered with a dull grey bloom, but this is absent in the new crop, in which the beans are much larger than the original. Shape somewhat elongated and fairly plump. Slightly damaged from weather. Crop takes somewhat over four months to mature, and is of fair average height, viz., nearly two feet. Yield good in comparison with other varieties.

"*Fairchild.*—A black bean; only a moderate yielder, being about equal in this respect to the White Sakura. Beans large, oblong, and slightly flattened. Quality poor and growth somewhat short. Several other better varieties.

"*Flat King.*—Jet black in colour, and with very little bloom. Large, flat, and oblong, very similar to Han Kow, though somewhat larger. Owing to lack of seed, only a few plants were grown. Might be given a further trial.

"*Haberlandt.*—Beans are very similar in colour to Austin, but slightly smaller. Although the original seed is of a uniform dull green colour, the crop appears to contain two distinct varieties, one a lighter green than the original seed, the other a yellow similar to Chinese White. Nearly round, though somewhat flattened at sides, and nicely plump, the beans make an attractive sample. A small plot in the garden yielded at the rate of 2000 pounds per acre, but the larger plot grown under field conditions only returned 800 pounds per acre. Is a good fodder bean, growing to a height of three feet. Worthy of more extended cultivation.

"*Holybrook.*—A yellow bean resembling Yellow Mammoth, but in habit is much more dwarf, only averaging 15 inches. The yield also is not as heavy, and it takes slightly longer to mature.

"*Hong-Kong.*—This bean provides a most extraordinary example of variation from the original seed, much more noticeable in some varieties than others. In the current crop hardly a bean resembles the original seed, which is medium small, of a dark buff colour, slightly elongated, and flattened. The crop harvested contains beans of yellow, buff, and through all shades of brown to black. Size also varies considerably. Of all these it would be impossible to say which would breed true to type. The crop proved a very poor yielder, and is not considered worthy of a more extended trial.

"*Ito San.*—A yellow bean of medium size, slightly elongated, but very little flattened. Crop harvested ripened irregularly, consequently sample is much damaged by shrivelled, bad seed. Probably this should have been left some little while longer to mature. Takes four months to complete growth, and is of a rather dwarf habit. Yield very poor indeed.

"*Jet.*—A black bean, as the name implies. Fair size and quality. Hardly grows high enough, but may improve in this respect with further cultivation. New seed is slightly fuller than the original sample. Much less bloom on the new seed than on the old.

"*Kingston.*—A black type which has done badly. Original seed was obviously adulterated with other black varieties, making hand picking of seed a matter of great difficulty. Otherwise seed was good, quite small, round and plump. New crop is much damaged and shrivelled, adulterated with yellow, brown, and green seeds. Practically worthless and unsuitable for further cultivation.

"*Merko.*—Of the yellow type, and standing second to Brownie as far as yield is concerned. The crop is of very fair sample, beans being considerably larger than the original seed. Beans slightly elongated and flattened, with hilum varying in colour from very light to very dark brown. Grows to an average height of over twenty-six inches, and will probably prove suitable for more extended cultivation.

"*Meyer.*—This belongs to the mottled group. The bean is brown, splashed with black streaks running in curved lines more or less parallel with each other and with the contour of the bean when

seen in lateral view. It is to be regretted that only a small sample of seed was available for sowing, enabling us to plant only the hundred and thirty-fifth part of an acre. This yielded at the rate of over 1500 pounds per acre, but on such a small area this must not be taken as a definite indication of the yield of the variety. Plants are nearly thirty-six inches long, but show a tendency to become trailing rather than stand erect. Should certainly be tried on a larger scale.

"*Tashing.*—One of the green type. Crop is disappointing both in yield and quality. Original seed was very similar in size and appearance to the Guelph or Medium Early Green, a variety which previously has done remarkably well at Cedara, but of which no viable seed was obtainable for last season's planting. The Tashing, however, is rather less yellowish in shade than the Guelph, and exhibits less bloom. The yield of Tashing beans was only 266 pounds per acre, and at least 75 per cent. of these are perfectly valueless, being shrivelled and spoilt by weather. Plants are dwarf in habit, and the crop cannot be recommended for further cultivation.

"*Wilson.*—A black bean of some promise. Yield was very fair for the first season—987 pounds per acre—and size of beans has much improved on the original. It is interesting to note that the heavy bloom found on all the imported black varieties is almost entirely absent in the new seed. This variety is very similar to Jet in appearance, and grows some two inches higher.

"*Mammoth Yellow.*—Colour as the name implies. A bean of very fair sample, plump, slightly elongated, and above the average in size. New crop shows an improvement in this respect as compared with the original. It is an excellent bean for fodder purposes, attaining a height of nearly three feet. Some excellent silage has been made from this variety during the current season at Cedara."

The comparative figures given in the table clearly indicate that while some of the varieties show a satisfactory adaptability to the conditions obtaining alike on the Natal coast, in the warmer of our upland districts, and in the cooler areas characterized by Cedara, other varieties are more exacting, and have only given relatively good returns at one or two centres. Thus the Haberlandt deserves extended cultivation throughout Natal, while types with extensive development and long-growing period, such as the Mammoth Yellow, the Natal White, Chinese White, and the Jet, give better results as grain producers in our warmer areas, and would preferably be grown as forage crops in the climate of Cedara. The Brownie and Merko, on the other hand, have yielded excellent returns of grain in the cooler climate of Cedara, but have failed at Winkle Spruit, and have given relatively unsatisfactory results at Weenen.

At the last-named centre, an average return of approximately 4½ muids from twenty-four varieties, including relative failures, and despite hail damage, can hardly be regarded as unsatisfactory, and from six new types yielding more than five bags from freshly imported seed, it should be possible to obtain by acclimatization and selection prolific strains adapted to different climates and soils from those here obtaining.

It will be noted that the Sakura variety, planted with seed taken from the consignment distributed for experiment throughout South Africa, comes very low down the list of averages, and it is confidently believed that very superior results will be obtained when sufficient

quantities of acclimatized seed of other and approved types are available for a similar purpose.

MANURE EXPERIMENTS.

When grown as a rotation crop with maize, the soya bean would normally secure its requirements of fertilizing ingredients from the residues of manures applied to the cereal. It has been thought well, however, to establish by actual experiment the response of the crop to specific fertilizers. At Cedara, Plot A5, an area of six acres, was marked off into seventeen sections, which received the manures given in the following table. Owing to an error in harvesting, the weight of stalks in sections 1 and 2 could not be separately determined:

		Weight of Crop per Acre.	
	Manures, in lb. per acre.	Stalks.	Beans. Lb.
Section	1.—No manure	1725	725
„	2.—Amm. sulph. 150, super. 300, potash 100		675
„	3.—Super. 300, mur. potash 100	3750	1225
„	4.—No manure	2750	625
„	5.—Amm. sulph. 150, mur. potash 100 ...	2150	500
„	6.—Amm. sulph. 150, super. 300	2350	575
„	7.—No manure	2100	500
„	8.—Super. 300	2000	450
„	9.—Amm. sulph. 150	2050	475
„	10.—No manure	1600	400
„	11.—Basic slag 300, mur. potash 100 ...	2650	650
„	12.—Basic slag 300, mur. potash 100 ...	2500	675
„	13.—No manure	1600	425
„	14.—Mur. potash 100	1300	700
„	15.—Basic slag 300	1750	400
„	16.—No manure	1050	225
„	17.—Basic slag 300	1700	525

The outstanding features of the above results are the deleterious effect of the application of nitrogenous manures, and the consistently satisfactory returns to the use of potash. It has been repeatedly found, in the course of our experiments at Cedara during a period of eight years, that ammonia salts, when brought into contact with seed in the drills, has a markedly deterrent effect on germination, which is enhanced in the case of leguminous crops by subsequent failure on the part of the plants to make adequate root and nodule development, which only ensue where there is marked deficiency of soil nitrogen. This issue was confidently anticipated, and the ammonia plots were inserted in the experiment to further demonstrate the absence of any necessity for providing nitrogen to the legume. This effect, moreover, is not confined to any one group of crops, for it has been found that in the soils of Cedara better results have been obtained without nitrogenous manures in the case of maize, potatoes, and other staples. Such a result is attributable to the rapid fixation of atmospheric nitrogen by independent soil bacteria, whose activity is stimulated by the generous rainfall and warmth of our growing season.

If the above influence of the ammonia salts be eliminated, it will be seen that consistently satisfactory returns were obtained from all plots to which potash was applied. The low yield of Plot 8 can only be attributed to local soil irregularity or to the influence of the acid phosphate, as both Plots 15 and 17 gave satisfactory increases to phosphoric acid in the shape of basic slag.

Experiments with Soya Beans.

Plate I. A Crop of Soya Beans at Cedara 1909–1910.

Experiments with Soya Beans.

Plate II. A Crop of Soya Beans at Cedara, 1910–1911.

Experiments with Soya Beans.

Plate III.

A Soya Bean Plant, showing botanical characters.

Experiments with Soya Beans.

Plate IV.

Roots of a Soya Bean Plant, showing nodular development.

Experiments with Soya Beans.

Plate V. Some of the Soya Bean Varieties at Cedara, 1910–1911.

Experiments with Soya Beans.

Plate VI. Some Soya Bean Varieties at Cedara, 1910–1911.

Experiments with Soya Beans.

Plate VII. Some Soya Bean Varieties at Cedara. 1910-1911.

Experiments with Soya Beans.

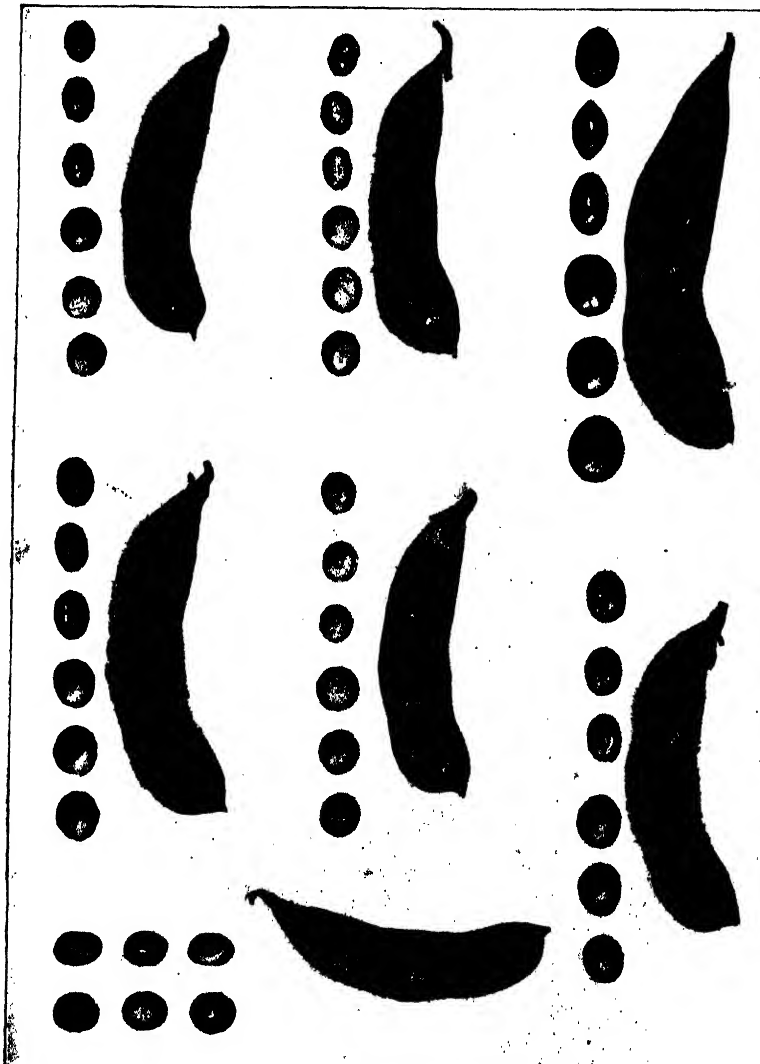


Plate VIII. SEEDS AND PODS OF SEVEN VARIETIES OF SOYA BEANS.

Natural size, reading from left to right, top row: Guelph, Ito San, Buckshot; second row: Austin, Hollybrook, Haberlandt; bottom row: Mammoth.

Experiments with Soya Beans.

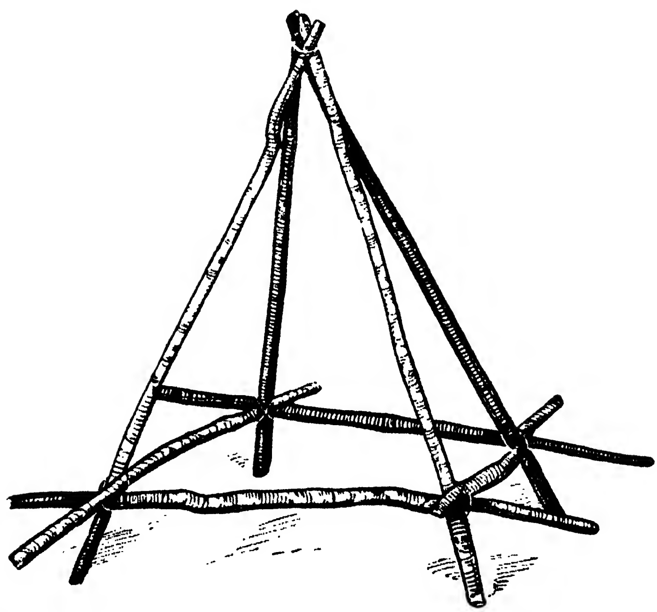


Plate IX. A Pole Frame for Curing Soya Beans.

From the results secured at all three stations, however, and particularly at Winkle Spruit, it would appear that the soya bean is particularly susceptible to injury from both nitrogenous and alkaline salts, and in certain soils also from acid phosphates, during germination and early development. For this reason alone an approved system would provide for the application of fertilizers to some other crop in the rotation.

The following table reflects the result of a similar experiment at the Weenen Station, carried out with seed received from Sutton's of England, which elsewhere gave unsatisfactory results:—

PLANTED 14TH NOVEMBER, 1910. Manures, in lb. per acre.	HARVESTED 27TH FEBRUARY, 1911. Weight of Crop per acre. Lb.
Section 1.—Bone dust 200, potash 100	480
„ 2.—Super. 200, potash 100	710
„ 3.—Slag 200, potash 100	760
„ 4.—No manure	690
„ 5.—Bone dust 200	630
„ 6.—Super. 200	800
„ 7.—Slag 200	630
„ 8.—Potash 200	400
„ 9.—No manure	730
„ 10.—Lime 300	830
„ 11.—Kraal manure (10 tons)	840
„ 12.—Gypsum 300	800

It will be noted that in the Weenen soils response to fertilizers is in the majority of cases very small, if not negligible, and their application could not be justified as a profitable investment. Both at this centre and at Winkle Spruit bone dust has had a most extraordinarily deterrent effect. This will be noted in Plots 1 and 5 of the above table, while corresponding Plot 5 at Winkle Spruit with a dressing of 250 lb. of bone dust did not germinate at all, although the adjacent no-manure plot made satisfactory development. It may be generally stated, therefore, that there has been a failure in the current season's experiments to justify any direct system of manuring to this restorative crop.

TIME OF PLANTING EXPERIMENT.

As already stated, the exigencies of farm work determined date of planting soya beans at Cedara. At Winkle Spruit, however, plots of two varieties were established in October, November, and December respectively, and the following results were obtained:—

	YIELD IN LB. PER ACRE.		
	October.	November.	December.
Chinese White	464	688	508
Natal White	452	1008	572

Such results would apparently clearly indicate November as the best month for planting soya beans on the Natal coast, which corresponds with similar results at Cedara in earlier years. The crop is particularly intolerant of a cold soil, and stands planted in September have often failed to mature before those established in November of the same season.

DISTANCE OF PLANTING EXPERIMENT.

The character of weed-growth in Natal precludes any system of planting for soya beans other than that of drilling. Thorough inter-row cultivation is necessary until the crop is well established, when,

in the case of the more vigorous varieties, the plants close in the spaces between the rows, and check subsequent weed development. The spacing between the rows should be adjusted to the habit of the plant, whether dwarf, semi-dwarf, or mammoth type. The soya bean seems very sensitive to crowding, and for such types as the Mammoth Yellow, Guelph, and Chinese White a 3-ft. spacing would not appear to be too much.

At the Weenen Station a distance of planting test was made with the semi-dwarf variety, Sutton's, when a maximum return was obtained from the 2-ft. rows. The actual returns are given in the following table:—

PLANTED 15TH NOVEMBER, 1910. HARVESTED 28TH FEBRUARY, 1911.

	Distance of Rows.	Yield in lb. per acre.
Section 1	3 feet rows	300
" 2	$2\frac{1}{2}$ " "	360
" 3	2 " "	480
" 4	$1\frac{1}{2}$ " "	370
" 5	1 " "	360
" 6	6 inch "	100

Variety: Sutton's. Manure: 200 lb. superphosphate and 120 lb. potash per acre.

A similar experiment is reported from the Purdue University Experiment Station. For three years these beans were planted at different distances and given the indicated treatment, with the following average results:—Drills 32 in. apart and cultivated gave a yield of 21.3 bushels; drills 24 in. and cultivated, 20.4 bushels; drills 8 in. and not cultivated, 15.6 bushels; broadcast and uncultivated, 10.7 bushels. The seed required per acre was 24 lb. for the first plot, 32 lb. for the second, and 80 lb. for the last two plots. The saving on the cost of seed, apart from increased yield, is sufficient to cover expenses of cultivation.

(To be continued.)

Acorn Poisoning in the Ostrich.

By Wm. Robertson, M.R.C.V.S., Acting Assistant Director of Veterinary Research, Grahamstown.

During the past two months I have met with three cases where a great and sudden mortality amongst adult ostriches was directly traced to the injudicious eating of ordinary ripe fallen acorns.

I take it that on some farms these as a cause of death are not so rare as we think, but the mortality is often put down to another cause, as most farmers regard acorns (with truth) as a suitable food for ordinary farm stock and even ostriches. As a rule the oak is not often met with in the neighbourhood of ostrich farm homesteads, as the veld best suited for birds is new land, and the three cases I am dealing with all occurred in the vicinity of farms established by the 1820 settlers, who were responsible for the oak-bordered paddocks now laid down in lucerne. The culture of ostrich and ostrich rearing is spreading even into the older settled parts of the Western Province with its host of oak trees, and it is with the view of putting farmers in such surroundings on their guard that I am publishing these few notes. Work with ostrich diseases is a somewhat unsatisfactory matter: disease and death appears suddenly, and if only two or so die the farmer—often great distances away—does not take any action; as a rule it is only when many die, and those of great value, that we are informed of any cases of sickness.

Adult ostriches, with the exception of internal parasites, are singularly free from any disease of the nature of an epidemic, and if we except anthrax or miltziekte, which is very sudden and fatal in this bird, I know of none. Once a bird is over three years his troubles are few (with the exception of those named) and he may live to a long age, and would no doubt do so if his great stupidity did not lead him to take fright at nothing and blunder into rails, fences, or sluits, and kill himself.

History of Mortality.

A very prominent farmer in this district, and a pioneer in the ostrich industry, came into the laboratory and stated that he had been away from home for a week, and on his return noticing a lot of thirty birds running in fine watered lucerne looked sick, he resolved to attend to them in the morning. Next day he found a cock worth £700 missing, seven others dead, and ten very sick; some of them his best young birds. Poison was suspected, and a dose of raw linseed oil (1 pint) given to each. I visited the farm and found the seven dead birds and the sick lot; one of the latter died, shortly after my arrival, in a regular flurry and evidently in great pain, and from the scraped appearance of the ground in their neighbourhood the others had succumbed in a similar manner. I made a post-mortem on this one first. Subject: *Hen bird*, still warm, carcass in very good condition and fat, abdomen somewhat distended and slightly blown up. *Lungs, heart, liver, spleen*, all normal. *Stomach* contained a large amount of

undigested foods, and at the lower end a quantity of whole undigested acorns (birds left acorn paddock on the 21st). The *intestines* showed all the signs of constipation with subsequent congestion. The *duodenum*, or first gut from the stomach, was swollen, thickened, and congested with blood, and the lining membrane showed signs of acute inflammation, and was covered with a dirty greyish white deposit or slime; on scraping this off the lining of the bowel was almost blood coloured. The other intestines (*jejenum* and *ileum*) showed similar lesions, and the twisted gut, called the *colon*, was simply packed with pellets of hard dung; these were so hard that they shot out from between the finger and thumb like a melon seed. These pieces of dung were pitch black in colour and covered with a grey slime and traces of blood; the lining of this gut was also blood red. The end pouch, or *cloacae*, simply packed hard with masses of dung. I made five other post-mortems and the appearances were the same in all cases.

CLINICAL SYMPTOMS.

I examined the sick birds; they showed varying degrees of sick ness; seven were the worst; these lay persistently, moved reluctantly when driven, and absolutely refused any kind of food; frequently they ruffled up their feathers and appeared as if about to dung, straining somewhat. Several dunged while I was in the kraal and passed a few nearly cylindrical pellets of the hardest ejecta I ever saw, and all passed a few ounces of urine. exactly like smooth green paint; this urine coloured all the kraal, and on looking at the rest of the bunch, which were not so badly affected, this symptom was noticed in several. Several of the birds appeared to be in pain and twisted their necks in the usual symptom.

TREATMENT.

I at once dosed all the birds with 25 ounces (a wine-bottleful) of raw linseed oil to which I added a level tablespoonful (4 drachms) of powdered barbadoes aloes; I found it best to dissolve the aloes in a little warm water and add to the oil.

Twelve hours after I gave every bird two bottles of warm water, in each of which I dissolved an ounce packet of bicarbonate of soda. The next day the birds were distinctly better; the medicine had operated on all, but the seven were not eating, so gave gruel, raw eggs, and brandy three or four times during the day. On the third day five birds started feeding when driven on to lucerne; one young cock of a very valuable strain and one old hen refused to feed. Gave each two bottles gruel with eggs and brandy four times a day. These two birds stand nearly motionless with closed eyes and seem to have some difficulty in maintaining their balance. On the fourth day I gave the cock and hen not feeding daily doses of 3 drachms of powdered gentian and 1 drachm of bicarbonate of soda in a gelatine capsule, and by hand gruel and cut prickly pear. These two birds started feeding the next day, that is nearly six clear days they were kept alive by hand feeding, and now they are quite recovered, but it has driven both of them and the others clean out of mating for the first part of this season, and they are shadows of their former selves, but picking up rapidly.

The birds must have eaten an enormous quantity of the acorns. The paddocks are all the same size, and in an empty one the ground was thick with the acorns, while where the birds had run *not a single* one was to be seen.

Second Case.

Here the farmer asked for advice, having lost nine valuable birds quite suddenly, and suspected arsenical poisoning, as he had some time before been using an arsenite of soda spray for jointed cactus. The birds were running in a mealie land with natural veld, receiving food in addition, such as prickly pear and cut sheaves of dry barley, and separated from a similar lot of birds receiving similar treatment. There were fifty birds in the lot; ten were dead when I arrived and about ten sick.

Post-mortem.—Subject: A young cock, first after chick. Body still warm and well nourished. Blood still fluid. *Lungs, heart, liver,* all normal. *Spleen* swollen and soft, due to the day being thundery and close. Decomposition was advancing with extreme rapidity. *Stomach* much distended with material, hard and firm to the touch, filled with tightly packed food, grass and cut dry barley, the grains of which had swollen and fermented, causing a sickly sour odour, and about five acorns. Small *intestine* thickened and inflamed, the lining (m. membrane) covered with a croupous exudate and very much inflamed. Other intestine (*caecum*) full of dark tarry material. The twisted gut (*colon*) packed with separated lumps of dung, hard and dry, and covered with mucus; the lining of the gut much inflamed: the *cloacae* packed with hard dry faeces.

I made in all four post-mortems and the salient symptoms were present in all.

Symptoms shown by Sick Birds.

Seen on Thursday, first noticed sick on the Tuesday. Birds lie persistently, seem much constipated, strain, appear giddy, and stagger on tiptoe, balancing themselves with their wings, and pass the green, paint-like urine before alluded to in the first case. I was at once struck by the similarity in the post-mortem between the first case and the second case, but in the latter it was difficult to find a clue; there were no oak trees in the neighbourhood, and only in the first bird's stomach did I find acorns. In all we found the stomach full of fermenting barley, and I was reluctantly compelled to accept that as the cause of death, the owner arguing that it could not be acorn poisoning as such trees did not exist in his neighbourhood. I treated the lot with 4 drachms (a level tablespoonful) of barbadoes aloes dissolved in a little water, and added to a wine-bottle of raw linseed oil, to be followed in twelve hours by a bottle of tepid water, in which had been dissolved a packet (1 ounce) bicarbonate of soda. I saw the birds two days after and they looked much better; all the sick ones with the exception of one had commenced to feed.

Third Case.

The owner informed me that the cause of the trouble *was acorns*, some bags of which had been brought on to the farm for pig food, and the ostriches had obtained access to them through a gap in the fence and finished the lot. I take it that the barley being above the acorns in the bird's stomach hastened death by fermentation and absorption of the poisonous gas evolved. I advised the owner to give the recovering birds a teaspoonful of powdered gentian, a tablespoonful (level) of bicarbonate of soda, and a level teaspoonful of ginger in a pill daily. I saw the birds recently, and even after a period of three weeks one can pick out the birds which were affected from the rest of the troop.

It may be argued that acorns are quite safe as an ostrich food. Personally I find them most excellent in moderation I have given birds a pound daily for three weeks with very beneficial results, but I take it that the birds in both the cases reported obtained sudden access to an unlimited quantity of acorns and gorged themselves. An ostrich seems to have a fascination for picking up and swallowing a small ovoid shiny body like an acorn and appears to go on feeding, quite unconscious of the fact that the gullet as well as the stomach is full.

Acorns contain a large quantity of tannic acid, a most astringent drug, and that is the whole reason for the sickness and mortality amongst the birds. I might say that I find barbadoes aloes and raw linseed oil a specially good purge for the ostrich and one very valuable to have on hand when poisoning is suspected. It is a reliable dose and nearly always does its work, whereas salts and plain oil are very disappointing; and it should be borne in mind that *an aperient given in two small doses never has such an effect as a single good dose,* therefore when you give one give the full amount.

Traumatic Pericarditis of Cattle or Inflammation of the Heart Sac caused by a Foreign Body taken into the Stomach.

By J. R. Hamilton, Government Veterinary Surgeon, Orange Free State.

This complaint is fairly common in South Africa, and as it appears not to be generally known by farmers a few remarks on the subject may be of interest. In several instances I have found people mistake it for contagious lung-sickness and report it as such ; and this is not unnatural when we find that some of the symptoms are somewhat similar in both complaints—in the live animal and also in the dead one, though in the latter the mistake ought not to be so common. On opening the chest cavity and seeing yellow fluid, with possibly inflammation and consolidation of a portion of the lung, a hasty conclusion is apt to be made that the case is true lung-sickness, when a more careful examination would reveal the real cause.

Cause of Complaint and Reasons for it.

Cattle are subject to it because they bolt coarse food with little or no preliminary mastication, and therefore do not so readily reject indigestible substances as nails, pieces of wire, etc. ; they are also fond of picking up all sorts of things about rubbish heaps. This is especially the case with milking cows, and my experience is that about four-fifths of the cases occur in them—oxen, young stock, and bulls being only rarely affected in South Africa.

When such things as nails, wire, etc., are swallowed they are either immediately retained in the second stomach or are returned to it from the large stomach by its movements in preparing the food, and this second stomach (honey-comb stomach or klein pens), with its cell-like structure, offers every facility for retaining such objects. It is true that nails, buttons, etc., may lie indefinitely in this stomach and do the animal no harm, but when the object is of a fair length, thin, and more or less pointed, it is a different tale. In my limited experience the cause of the complaint has invariably been a piece of wire, about as thick as a knitting needle and 3 or 4 inches in length.

In discussing why such an object almost invariably works forward towards the heart, we must first note the relative positions of the organs. The second stomach lies immediately behind the diaphragm (curtain which separates the abdominal and chest cavities), and the heart with its sac immediately opposite it in front of the diaphragm. Two factors would appear mainly to influence the movements of the object, one being a suction or tractive power exerted by the pulsation of the heart itself and the other pressure from behind by the motions of the coarse food

in the stomach. In one case I found the piece of wire had not only penetrated the heart sac, but had gone right through the thick heart wall to the inside.

An interesting case which I had a few months ago showed on post-mortem the heart and its sac not affected, but immediately adjoining it a mass of inflammatory growth, and in the middle of this a curved piece of wire $3\frac{1}{2}$ inches long. Now I am firmly of opinion that this wire started to penetrate directly for the heart, but, being curved, could not advance in a straight line, and therefore missed it.

SYMPTOMS.

These vary according to the stage of the disease, and are often so obscure that even the most experienced and careful person cannot give a positive opinion as to the nature of the complaint. It would therefore be useless, and possibly misleading, to go into them very minutely.

In the early stage the symptoms are often those of ordinary indigestion, such as intermittent suspension of cudding, listlessness, disinclination for active movement, and may be occasional tympanitis (blowing up of the stomach). As the disease advances there is more marked disinclination for movement, and the animal probably stands for a considerable time with the back slightly arched and an anxious expression on the face; when going to lie down it does so with great care, and seldom lies long at a time. If a person approaches it roughly, or taps it with the fist on the side, it may give a groan or grunt of pain.

When trying to eat or drink it may give a partly suppressed painful cough, but softer than the cough of contagious lung-sickness. In an advanced and typical case even a non-expert can detect the abnormal heart-sounds by placing his ear to the left side behind the elbow, the heart beats being accelerated up to 100 or more per minute, and often gives a clear, sharp ring quite unlike the deep thud of a healthy heart. In other cases the heart sounds are very muffled and appear far off, and sometimes there is a sound as of the heart working in liquid.

The duration of the complaint from the time the foreign body begins to pierce the stomach wall till death varies very much, and I think may be put down as any time from a week to a couple of months. I am, however, open to correction on this point. If there is much septic matter carried by the wire into the chest cavity death is quicker than if there is little. But in some rare cases death may occur very quickly from shock. I had an instance of this lately, when a bull suddenly dropped dead after a few days' slight illness. In this case I found a piece of tough reed had penetrated to the chest from the stomach and, I presume, implicated some vital nerve, and so caused death.

TREATMENT.

It will be evident to every one that treatment in such a complaint is useless. Experts have operated in some cases, but as a rule the operation is a failure, chiefly on account of the difficulty of positively diagnosing the malady at a sufficiently early stage. The difficulties of guarding against its occurrence are also very great, as pieces of wire, such as I have described, are scattered almost everywhere.

POST-MORTEM APPEARANCES.

On opening the chest cavity the heart sac is usually found to be enlarged by thickening of its wall and covered with a yellow exudate. This exudate may also be over the lungs and chest wall and some of it floating loose in the chest. A portion of one or both lungs is often found to be consolidated and showing evidence of septic inflammation. These general appearances, as I have before mentioned, sometimes lead a casual observer to believe that the case is one of contagious lung-sickness. In several instances I have known natives opening an animal so affected to exclaim at once, "Oh, baas, lung-sickness". But the mistake need not be made by any one who knows true lung-sickness, because, independently of finding the cause, the typical marbling appearance of the lung in contagious lung-sickness is absent in this complaint.

In looking for the piece of wire or other foreign body it is best to remove the whole of the internal organ in one mass carefully and then search in the region of the heart sac and second stomach before they are much tossed about, as otherwise the wire may drop out and lie on the ground unobserved.

Milk Record.

ELSENBURG COLLEGE HERD.

Breed and Name of Cow.	Days in Milk.	Yield in Lb.		
		During June.	Total to Date.	Daily Average.
Frieslands.				
Rose	287	485	7814	27·2
Bell	216	437	5247	24·2
Veronica	193	419	3857	20·0
Boerin	149	67	2010	13·4
Cato	125	246	1240	9·9
Victoria	97	737	2782	28·6
Anna	83	286	1021	12·3
Christina 58	83	437	1498	18·0
Daisy	45	703	1262	28·0
Violet	34	1085	1242	36·5
Beauty	32	1115	1182	36·9
Vera	32	1112	1183	36·9
Jerseys.				
Evelyn	286	60	3361	11·7
Glee	279	142	5132	18·3
Gwendolen	76	477	1440	18·9
Gertie	76	661	1867	24·5
Grace	59	529	1208	20·4
Gus...	51	496	854	16·7
Gladys	50	608	1073	21·4
Gilliflower...	30	575	575	19·1
Fanny	16	330	330	20·6
Ayrshire.				
Lobelia	61	655	1539	25·2

Average percentage of butter fat ... { Frieslands ... = 3·18 per cent.
Jerseys ... = 5·12 „
Ayrshire ... = 3·6 „

Millets.

By J. A. T. Walters, B.A., Assistant Botanist (Transvaal).

Introductory.

There are at the present time about twenty-four leading varieties of millets on the European and American markets. With no class of seeds has so little been effected in the way of classifying the varieties and assigning a fixed name to each. Many varieties are grown in different parts of the world under one name, and the same variety not infrequently passes under different names in other localities. Constant complaints are made by seedsmen and growers that millet seeds are not true to name. One of the reasons for this confusion is the difficulty in determining the variety from the seed. The seed is almost identical in a group of millet varieties such as Boer Manna, Golden Millet, German Millet, all of which are derived from one common parent—the grass known as *Setaria italica*.

The seed of Japanese barnyard millet differs considerably from the others, the plant being derived from another parent—the grass called *Panicum Crus-galli*. These seeds are greyish in colour, flat on one side, round on the other, and the husk is persistent and angular, covering the seed loosely.

In the broomcorn millets (*Panicum miliaceum*) the seeds are large and rounded, and either pearly white or reddish in colour.

The seeds of pearl millet are distinctly bluish in tinge and larger than any of the others, pear shaped, i.e. rounded at one end and pointed at the other.

Classification.

Many attempts have been made to classify the various varieties of millets under cultivation, the most thorough of which was that of Dr. Körnicke in 1885, who based his classification on the following characteristics:—

1. Size of heads.
2. Size and colour of beards.
3. Colour of seeds.

On this basis he divided the cultivated millets into sixteen varieties and assigned a botanical name to each. This was twenty-six years ago. Since that time many new varieties have been produced through selection by growers, or have been imported from other countries, and it is now usual to group millets into three large classes, as follows:—

I.—*Foxtail Millets*, or "Mannas", having a compact cylindrical, nodding head, in some cases slightly tapering at one or both ends, from 3 to 8 inches long (Plates 1, 3, 4, 5, and 6). These are again subdivided as follows:—

(*a*) Large-headed varieties: Boer Manna, German Millet. Golden Millet, Golden Wonder Millet, Japanese Foxtail Millet, Italian Millet, and Red Siberian Millet.

The millets of this group stand from 2½ ft. to 4 ft. high, and have heads from 6 to 8 inches long (Plates 1, 3, and 4).

(*b*) Small-headed varieties: Common Millet, Hungarian Millet, Californian Green Moha, Early Caucasian. These are shorter than the above varieties, and the heads rarely exceed 4 inches in length (Plates 5 and 6).

II.—*Barnyard Millets*: Japanese Barnyard Millet, Ankee Millet, and Shama Millet. The first is the only one cultivated in South Africa (Figure 7).

III.—*Broomcorn Millets*: Here the seed is a loose panicle (Figure 2). There are a great number of varieties in this group, many of which are identical, going under slightly different names: French White, Improved White French, White Pearl, Brown Millet, Early Fortune, Manitoba, Californian Beauty, Turkish Millet, Chinese White, and Japanese White.

IV.—*Pearl Millet* (*Pennisetum spicatum*) (Figure 8).

The above classification has the additional advantage of separating the millets according to their origin. A short description of the principal varieties grown in the Transvaal is given below. The notes are from observations taken on the plants growing at the Experiment Station, Skinners Court, Pretoria.

I.—FOXTAIL MILLETS, OR MANNAS.

German Millet (Plate 1).—Plants 3½ to 4 ft. high. Leaves numerous and broad, having a bright golden tinge when mature, particularly near the base. Heads 4 to 5 in. long, redder in tinge and with longer beards than Boer Manna; compact, hardly showing the sub-divisions. Seeds small and yellow in colour. Stems usually single from the root and rather thick. Maturing about a month earlier than Boer Manna.

Boer Manna (Plate 3).—Plants 4½ to 5 ft. high. Later and more prolific than the other heavy-yielding varieties which it otherwise resembles. Heads up to 7 in. long, narrower, and more open than in Golden or German Millets, and also less bearded. Do not taper at the point or base. Seeds small, yellowish. Stems thinner than Golden or German Millet.

Red Siberian.—Plants up to 4 ft. high, well covered with long leaves, the whole having a dark red appearance at maturity. Heads up to 6 in., resembling Boer Manna heads, but redder and looser; beards long. Leaves 1 in. across. As many as twelve leaves on some plants.

Golden Millet (Plate 4).—Plants about 3½ to 4 ft. high. Resembling German Millet and equally early, but with shorter, thicker, and more compact heads. Leaves and stems become golden yellow in colour as the plant ripens. Heads up to 5 in. long. Straw and stem finer than in German Millet. Seeds small, roundish, yellow.

A variety called *Kaalkop* is grown by some farmers in the Transvaal. This variety is almost beardless and has a purplish tint. The heads are as long as those of Boer Manna, and one farmer admits that he obtained his variety by selection in the field.

Italian Millet.—This is not so well known as the other varieties. It strongly resembles German Millet, but the heads are thinner and run to about 7 inches long.

Golden Wonder.—This variety is reputed to be the heaviest seed yielder of the Foxtail group of millets. Heads generally longer and looser than those of the other varieties.

New American Varieties.—Several of these have been tried at the Experiment Station, Skinners Court, and one marked 22425 proved to be a splendid yielder of forage. The heads were characterized by unusually long beards.

Small-headed Varieties (Plates 5 and 6).—In these varieties the heads are rarely more than half the size of the above varieties. The plants also rarely exceed 3 feet in height, the yield of forage falling very far short of that obtained from German Millet or Boer Manna. The straw and leaves are, however, much finer than in the other varieties, and these millets are grown extensively in America for that reason, being much preferred as forage to the coarser and bigger varieties.

Among the chief varieties of the above class grown in South Africa are:—

Hungarian Millet.
California Green Moha.
Early Caucasian.
Common Millet.

The seeds of these varieties in general are large and yellowish, and in the case of Hungarian Millet a high percentage of black seeds may be found, or they may be entirely black. Although there are still differences between the varieties, a description of Hungarian Millet and California Green Moha will give a fair idea of all the millets of this class. A variety resembling these is grown in this country under the name of Red Millet on account of the purplish colour of the beards and the seed husks. It is found, like the above varieties, to do better on poor soils and to be more drought resistant than the heavier varieties.

Hungarian Millet.—Grass-like plant, 2 to 3 ft. high. Decidedly inferior in yield of forage to Boer Manna or German Millet, but better adapted to poor soils and dry conditions than the heavier-yielding varieties. Heads 2 to 4 in. long, thin, and bearded. Compact towards the apex, but loose at the base, which gives them an irregular appearance. Seed bigger than Boer Manna or German Millet, and partly or entirely black in colour, pointed at one end. Several stems from the same root.

California Green Moha is considered by French writers to be only an improved variety of Hungarian Millet, retaining the green colour of head even when ripe and being more leafy. It is also considered to be earlier, but requires a richer soil.

Early Caucasian (Plate 6).—Plants 18 in. high. Heads 2-3 in. long. Leaves narrow and long, but very plentiful. An early variety, but inferior in yield of forage.

Common Millet.—There would seem to be two varieties grown under this name, both belonging to the Foxtail group of millets, one having a shorter head than the other and standing about a foot lower. The variety generally known as Common Millet is the shorter one, with the smaller head (Plate 5).

II.—BARNYARD MILLETS (PLATE 6).

These differ distinctly from the Foxtail varieties, in that the seed-head has each division well separated and from 1 to 2 in. long, giving it an open appearance as contrasted with the well-packed appearance of the Foxtail millets. The head is of a dark grey colour, the seed husks

being angular, and the seed itself of a light drab colour. The principal variety grown is the Japanese.

In comparatively dry districts the Barnyard Millets do not offer any advantage over the Foxtail Millets in point of yield, and are also reputed to be poor drought resisters. But excellent results have been obtained with them on the eastern high veld of the Transvaal. Provided the season is favourable they yield a heavy crop, and are ready for cutting for forage in two and a half months from the time of sowing; and if sown early there seems to be no reason why a second cutting should not be obtained the same season. Japanese Barnyard forage is considered by Americans to be superior to that of any of the other varieties.

III.—BROOMCORN MILLETS (PLATE 2).

These are essentially bird-seed millets, producing in every case large white, yellow, or red seeds about twice the size of the seeds of the Foxtail group. The plants are generally low-growing, rarely exceeding 2 ft., except in the case of the improved varieties, and the heads form open nodding panicles somewhat like broomcorn heads. The French varieties produce seed of a pearly white colour, and almost as large as Pearl Millet seed, and are known under such names as French White, White French, and Improved French. Early Fortune has a reddish seed, and Brown Millet seeds are still a darker red. Plates 9 and 10 show the relative size of seeds. We have no Transvaal returns as to the weight of seed obtained from these Broomcorn varieties, but the American returns give as high as 50 bushels, or 2500 lb., per acre.

The value of the Broomcorn Millets lies almost entirely in the seed produced, which is used for feeding cage birds; the leaves tend to disappear in most cases when the plant arrives at maturity. These millets are largely grown in Russia, where they are called "Proso" millets, a name adopted by some American writers in describing them.

White French, French White, and Improved White French.—Probably the same variety under different names, standing about 2 ft. high, all having white seeds distinctly larger than those of the other varieties.

White Millet.—The tallest of the Broomcorn Millets, with a thicker stem and longer panicle than the others. Plants up to 3 ft. 6 in. high.

Early Fortune.—From 18 in. to 2 ft. 6 in. high. Heads up to $4\frac{1}{2}$ in. long in a compact panicle. Seeds of a reddish brown colour.

Red Orenburg, Black Voronezh.—Russian varieties, standing up to 2 ft. 6 in., the latter having seeds almost black in colour.

Brown Millet.—One of the smallest varieties, characterized by brown seeds.

IV.—PEARL MILLET.

This variety is quite distinct from the others, growing from 6 to 15 ft. high and having a compact cylindrical upright head up to 10 in. long. This variety gives an enormous amount of forage, but of a coarse and inferior quality. Its chief value lies in the seeds, which are of a large size and are produced abundantly, and are much used as food for poultry and by the natives for making beer. Plate 8 shows some of the different types to be obtained of this variety in the

country. The improved strain sold by seedsmen has a head similar to the smaller one of the three, but is twice as long.

Under the name of Italian Millet a variety was tried at Skinners Court which resembled Pearl Millet, but the heads, instead of being long and cylindrical, were round and almost ball-shaped.

LIST OF PLATES.

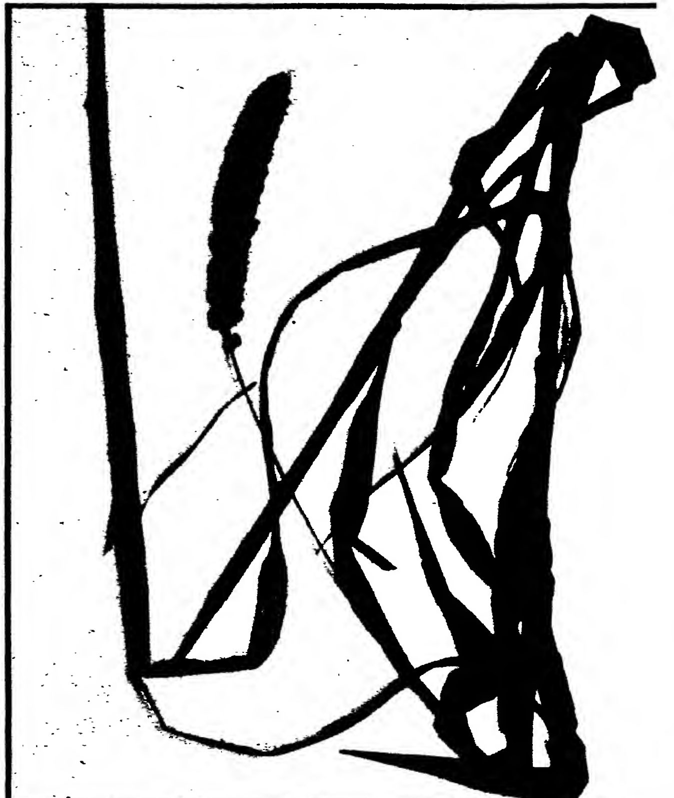
1. German Millet.
2. Broomcorn Millet: White Pearl.
3. Boer Manna.
4. Golden Millet.
5. Common Millet.
6. Early Caucasian.
7. Japanese Barnyard Millet.
8. Pearl Millet.
9. }
10. } Millet Seeds: Comparative size.

Millets.

German Millets (Fig. 1).

Broom Corn Millet (Fig. 2)

Millets



Boer Manna (Fig. 3).

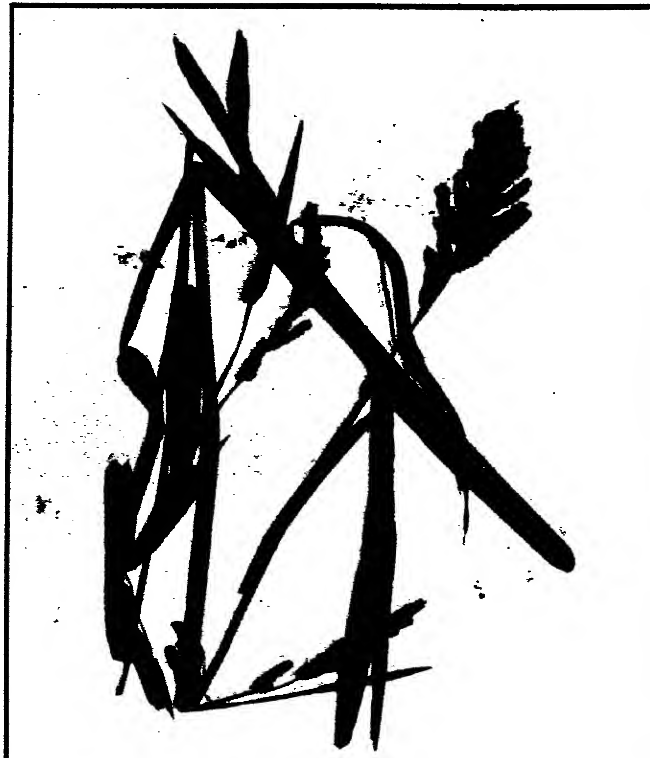
Golden Millet (Fig. 4).

Millets.

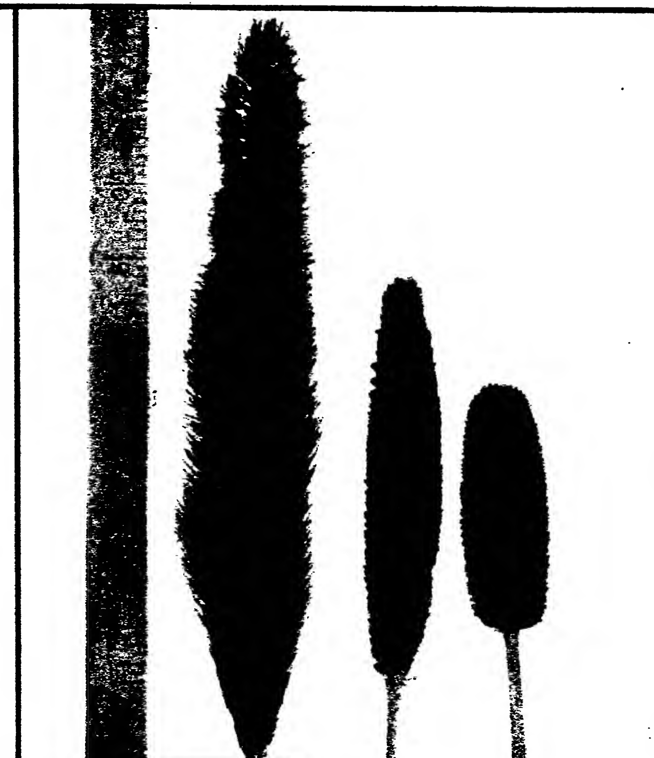
Common Millet (Fig. 5).

Very Early Caucasian (Fig. 6).

Millets.

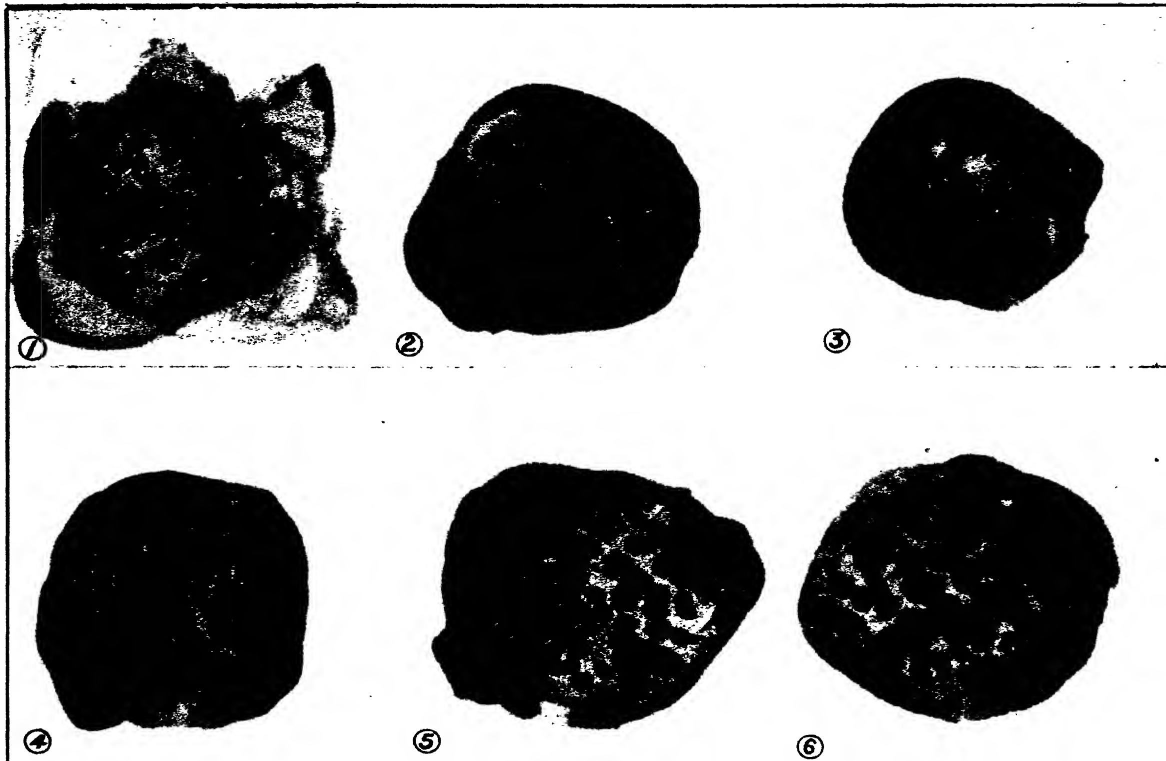


Japanese Millet (Fig. 7).



Pearl Millet (Fig. 8).

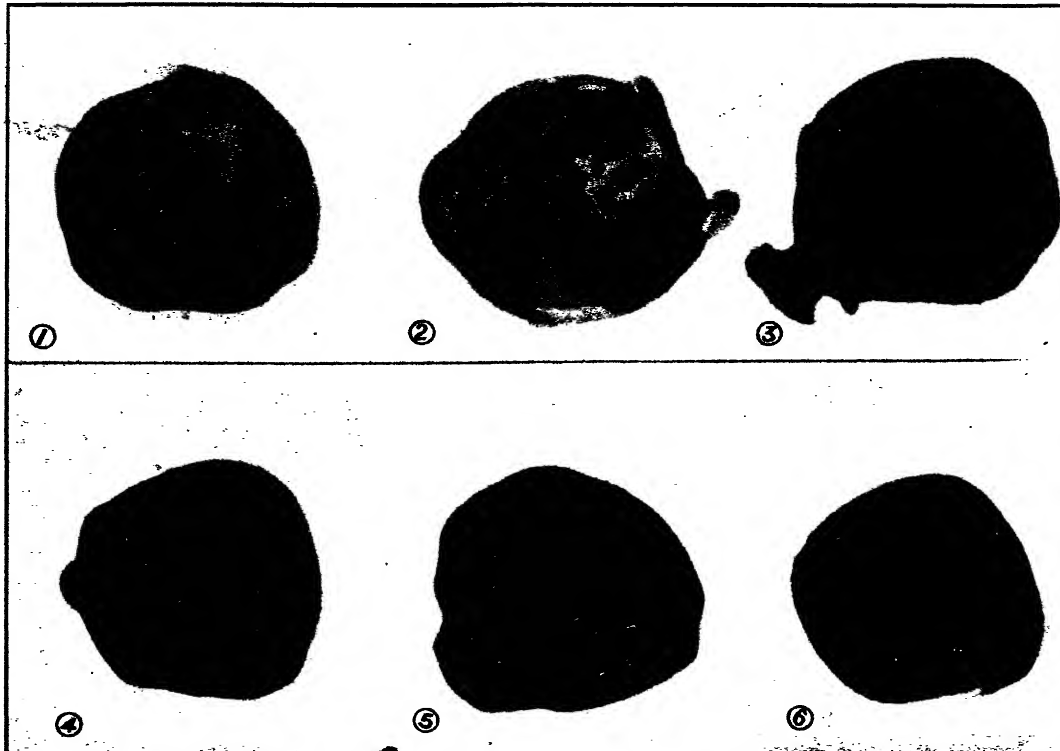
Millets.



COMPARATIVE DIAGRAM (Fig. 9).

1. Indian. 2. Common. 3. Californian. 4. White French. 5. Early Fortune. 6. Pearl Millet.

Millets.



COMPARATIVE DIAGRAM (Fig. 10).

1. Boer Manna. 2. German Millet. 3. Golden.
4. Red Siberian. 5. Hungarian. 6. Japanese Barnyard.

Outbreaks of Animal Diseases.

RETURNS FOR THE MONTH OF JUNE, 1911.

THE following returns show the outbreaks of contagious and infectious diseases of animals up to the end of June, 1911, in the several Provinces of the South African Union:—

I.—CAPE PROVINCE.

Summary of Outbreaks of Scheduled Contagious and Infectious Animal Diseases reported during the month ended 30th June, 1911.

DISTRICT.	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Spons-ziekte.	TOTAL
Alexandria..........	.	1	.	.	2	3
Barkly East........	.	.	.	.	1	1
East London........	.	.	.	1	1	2
Glen Grey..........	.	.	.	.	2	2
Herschel............	.	2	.	.	2	4
Kingwilliamstown....	.	1	.	.	5	6
Komgha............	.	.	.	1	.	1
Kuruman...........	.	1	.	.	.	1
Queenstown.........	.	.	.	.	1	1
Riversdale..........	.	.	1	.	.	1
NATIVE TERRITORIES.						
Tembuland.						
Umtata.............	2	.	.	.	.	2
Engcobo............	1	.	.	3	.	4
St. Mark's..........	.	.	.	1	.	1
Mqanduli...........	5	.	.	.	.	5
Transkei.						
Nqamakwe..........	.	.	.	.	3	3
Willowvale..........	1	.	.	1	.	2
Pondoland.						
Libode.............	.	.	.	1	.	1
Bizana.............	2	.	.	.	.	2
Flagstaff...........	.	.	.	.	1	1
East Griqualand.						
Umzimkulu.........	6	.	.	.	.	6
Tsolo...............	.	.	.	1	.	1
Mount Fletcher......	.	.	.	.	4	4
TOTALS.........	17	5	1	9	22	54

II.—NATAL.

Summary of Fresh Outbreaks of Contagious Diseases reported during the month ended 30th June, 1911.

DISTRICT.	Rinderpest.	Pleuro-Pneumonia.	East Coast Fever.	Tuberculosis.	Foot and Mouth Disease.	Anthrax.	Glanders.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Ulcerated Lymphangitis.	Sheep-pox.	TOTAL NUMBER OF OUTBREAKS.
Newcastle	.	.	.	.	.	.	.	6	.	.	2	.	.	8
Dundee and Umsinga	.	.	.	.	.	.	.	5	.	.	.	.	.	5
Klip River	.	.	.	.	.	.	.	2	.	.	.	.	.	2
Camperdown	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bergville	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Estcourt	.	.	2	.	.	.	.	16	.	.	.	.	.	18
Weenen	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Krantzkop	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Umvoti	.	.	.	.	.	.	.	1	.	.	.	1	.	2
New Hanover	.	.	.	.	.	.	.	1	.	.	.	.	.	1
Mapumulo	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lower Tugela	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Inanda	.	.	.	.	.	.	.	.	.	.	.	3	.	3
Indwedwe	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lion's River	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pietermaritzburg and Umgeni	.	.	.	.	.	.	.	5	.	.	.	.	.	5
Impendhle	.	.	1	.	.	.	.	.	.	.	.	.	.	1
Ipolela	.	.	3	.	.	.	.	.	.	.	.	.	.	3
Underberg	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Richmond	.	.	.	.	.	1	.	.	.	.	.	.	.	1
Ixopo	.	.	5	.	.	.	.	3	.	.	.	.	.	8
Alfred	.	.	5	.	.	.	.	3	.	.	.	.	.	8
Lower Umzimkulu	.	.	.	.	.	.	.	.	.	.	.	1	.	1
Alexandra	.	.	2	.	.	.	.	.	.	.	.	.	.	2
Durban and Umlazi	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vryheid, Ngotshe, and Babanango	.	.	.	.	.	.	.	33	.	.	.	.	.	33
Utrecht	.	.	1	.	.	.	.	1	.	.	.	.	.	2
Paulpietersburg	.	.	.	.	.	.	.	11	.	.	.	.	.	11
Zululand	.	.	.	.	.	.	.	11	.	.	.	.	.	11
TOTALS	.	.	19	.	.	1	.	98	.	.	2	5	.	125

II.—NATAL (*continued*).

Return of Cases of Contagious Diseases existing on 30th June, 1911.

District.	Rinderpest.	Pleuro-Pneumonia.	East Coast Fever.	Tuberculosis.	Foot and Mouth Disease.	Anthrax.	Glanders.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Ulcerated Lymphangitis.	Sheep-pox.	Total Number of Out-breaks.
Newcastle..........	.	.	20	.	.	.	.	13	.	.	5	.	.	38
Dundee and Umsinga	.	.	133	.	.	.	.	6	.	.	327	.	.	466
Klip River.........	.	.	114	.	.	.	.	13	.	.	8	.	.	135
Camperdown.......	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Bergville...........	.	.	23	.	.	.	.	2	.	.	7	.	.	32
Estcourt...........	.	.	93	.	.	.	.	23	.	.	.	.	.	116
Weenen............	.	.	43	.	.	.	.	1	.	.	5	.	.	49
Krantzkop.........	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Umvoti............	.	.	138	.	.	.	.	17	.	.	21	1	.	177
New Hanover......	.	.	*	.	.	.	.	1	.	.	.	2	.	3
Mapumulo.........	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Lower Tugela......	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Inanda............	.	.	*	.	.	.	.	.	.	.	.	58	.	58
Indwedwe..........	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Lion's River.......	.	.	77	.	.	.	.	4	.	.	.	.	.	81
Pietermaritzburg....	.	.	†	.	.	.	.	7	.	.	.	.	.	7
Umgeni............	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Impendhle.........	.	.	30	.	.	.	.	.	.	.	.	.	.	30
Ipolela............	.	.	22	.	.	.	.	.	.	.	.	.	.	22
Underberg.........	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Richmond.........	.	.	64	.	.	.	.	.	.	.	.	1	.	65
Ixopo.............	.	.	141	.	.	.	.	8	.	.	3	.	.	152
Alfred.............	.	.	21	.	.	.	.	5	.	.	.	3	.	29
Lower Umzimkulu..	.	.	*	.	.	.	.	.	.	.	.	3	.	3
Alexandra.........	.	.	61	.	.	.	.	.	.	.	.	.	.	61
Durban............	.	.	†	.	.	.	.	.	.	.	.	13	.	13
Umlazi............	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Vryheid, Ngotshe, and Babanango.	.	.	*	.	.	.	.	45	.	.	4	.	.	49
Utrecht............	.	.	31	.	.	.	.	3	.	.	22	.	.	56
Paulpietersburg....	.	.	*	.	.	.	.	11	.	.	.	.	.	11
Zululand...........	.	.	*	.	.	.	.	35	.	.	3	2	.	40
Totals........	.	.	1010	.	.	.	.	194	.	.	405	83		1692

* Whole district looked upon as infected.
† Practically clean.

III.—TRANSVAAL.

Summary of Fresh Outbreaks of Contagious Diseases during month of June, 1911.

District.	Rinderpest.	Pleuro-Pneumonia.	Rhodesian Redwater.	Tuberculosis.	Foot and Mouth Disease.	Anthrax.	Glanders.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Ulcerated Lymphangitis.	Sheep-pox.	Total Number of Outbreaks.
Barberton	.	.	.	.	.	.	.	4	.	.	.	.	.	4
Bethal	.	.	.	.	.	.	.	5	.	.	.	.	.	5
Bloemhof	.	.	.	.	.	.	.	30	.	.	.	.	.	30
Carolina	.	.	.	.	.	.	.	4	.	.	.	.	.	4
Ermelo	.	.	.	.	.	.	.	17	.	.	.	.	.	17
Heidelberg	.	.	.	.	.	.	.	9	.	.	.	.	.	9
Krugersdorp	.	.	.	.	.	.	.	4	.	.	.	.	.	4
Lichtenburg	.	.	.	.	.	.	.	16	.	.	.	.	.	16
Lydenburg	.	.	.	.	.	.	.	8	.	.	.	.	.	8
Marico	.	.	.	.	.	1	.	7	.	.	.	.	.	8
Middelburg	.	.	1	.	.	.	.	5	.	.	.	.	.	6
Piet Retief	.	.	1	.	.	.	.	4	.	.	.	.	.	5
Potchefstroom	.	.	.	.	.	.	.	35	.	.	.	.	.	35
Pretoria	.	.	.	2	.	.	.	2	.	.	.	2	.	6
Rustenburg	.	.	.	.	.	.	.	9	.	.	.	.	.	9
Standerton	.	.	.	.	.	1	.	23	.	.	.	.	.	24
Wakkerstroom	.	.	.	.	.	.	.	8	.	.	.	.	.	8
Waterberg	.	.	.	.	.	.	.	2	.	.	.	.	.	2
Wolmaransstad	.	.	.	.	.	.	.	33	.	.	.	.	.	33
Witwatersrand	.	.	.	3	.	1	.	.	.	.	.	.	.	4
Zoutpansberg	.	.	5	.	.	.	.	5	.	.	.	.	.	10
TOTALS	.	.	7	5	.	3	.	230	.	.	.	2	.	247

III.—TRANSVAAL—(*continued*).

Summary of Outbreaks of Contagious Diseases existing on 30th June, 1911.

DISTRICT.	Rinderpest.	Pleuro-Pneumonia.	Rhodesian Redwater.	Tuberculosis.	Foot and Mouth Disease.	Anthrax.	Glanders.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Ulcerated Lymphangitis.	Sheep-pox.	TOTAL NUMBER OF OUT-BREAKS.
Barberton			31					53						84
Bethal								17						17
Bloemhof								142						142
Carolina			23					66						89
Ermelo								188						188
Heidelberg								120						120
Krugersdorp		3						3						6
Lichtenburg								136						136
Lydenburg			29					173						202
Marico			4					17						21
Middelburg			16					113						129
Piet Retief			36					154						190
Potchefstroom								147						147
Pretoria			1					102						103
Rustenburg			8					117						125
Standerton								81						81
Wakkerstroom								170						170
Waterberg			28					24						52
Wolmaransstad								161						161
Witwatersrand								37						37
Zoutpansberg			65					112						177
TOTALS		3	241					2133						2377

IV.—ORANGE FREE STATE.

Fresh Outbreaks of Contagious Diseases during month of June, 1911.

DISTRICT.	Rinderpest.	Pleuro-Pneumonia.	African Coast Fever.	Redwater (Ordinary).	Tuberculosis.	Foot and Mouth Disease.	Anthrax.	Glanders.	Mange.	Ulcerated Lymphangitis.	Swine Fever.	Swine Erysipelas.	Sheep-pox.	Scab.	TOTAL NUMBER OF OUT-BREAKS.
Bethlehem.....	.	.	.	.	.	.	.	.	.	.	.	.	.	14	14
Bethulie........	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bloemfontein and Brandfort	.	.	.	.	.	.	.	.	.	.	.	.	.	17	17
Boshof.........	.	.	.	.	.	.	.	.	.	.	.	.	.	22	22
Edenburg......	.	.	.	.	.	.	.	.	.	.	.	.	.	10	10
Fauresmith....	.	.	.	.	.	.	.	.	.	.	.	.	.	35	35
Ficksburg......	.	.	.	.	.	.	.	.	.	.	.	.	.	18	18
Frankfort......	.	.	.	.	.	.	.	1	.	.	.	.	.	13	14
Harrismith.....	.	.	.	.	.	.	.	.	.	.	.	.	.	26	26
Heilbron.......	.	.	.	.	.	.	.	.	.	.	.	.	.	6	6
Hoopstad......	.	.	.	.	.	.	.	.	.	.	.	.	.	16	16
Jacobsdal......	.	.	.	.	.	.	.	.	.	.	.	.	.	22	22
Kroonstad.....	.	.	.	.	.	.	.	.	.	.	.	.	.	22	22
Ladybrand.....	.	.	.	.	.	.	.	.	.	.	.	.	.	6	6
Lindley.........	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3
Philippolis.....	.	.	.	.	.	.	.	.	.	.	.	.	.	14	14
Rouxville......	.	.	.	.	.	.	.	.	.	.	.	.	.	26	26
Senekal........	.	.	.	.	.	.	.	.	.	.	.	.	.	10	10
Smithfield......	.	.	.	.	.	.	.	.	.	.	.	.	.	16	16
Thaba 'Nchu...	.	.	.	.	.	.	.	.	.	.	.	.	.	23	23
Vrede.........	.	.	.	.	.	.	.	1	.	.	.	.	.	3	4
Vredefort......	.	.	.	.	.	.	.	.	.	.	.	.	.	7	7
Wepener.......	.	.	.	.	.	.	.	.	.	.	.	.	.	8	8
Winburg.......	.	.	.	.	.	.	.	.	.	.	.	.	.	9	9
Trompsburg ...	.	.	.	.	.	.	.	.	.	.	.	.	.	5	5
TOTALS....	.	.	.	.	.	.	.	2	.	.	.	.	.	351	353

The Manuring of Vineyards.

Lectures delivered at the Paarl on the 16th and 31st May, 1911, by Dr. A. I. Perold, Government Viticulturist (Cape).

PART II.

THE DIFFERENT KINDS OF FERTILIZERS.

I WILL now try to give you the necessary information concerning the different kinds of fertilizers, and I will specially dwell on those fertilizers which are of special value for us. These fertilizers can be divided into—

I. ORGANIC FERTILIZERS	A.—Kraal and Stable Manure (fresh). B.—Karoo Sheep Manure. C.—Guano. D.—Dried Blood. E.—Green Manure.
II. CHEMICAL OR INORGANIC FERTILIZERS	A.—Sulphate of Ammonia. B.—Nitrate of Soda. C.—Nitrate of Lime. D.—Lime Nitrogen. E.—Potash Salts. F.—Phosphates. G.—Lime.

I.—ORGANIC FERTILIZERS.

A.—*Kraal and Stable Manure (Fresh).*

These are the longest known of all fertilizers, and we can at once state that they are the only complete fertilizers. Therefore every farmer will understand that it is of the greatest importance for him to produce as much manure on his farm as possible. In some places this is done in a rational manner, although very often much is lost through bad or wrong treatment. M. Grandeau has calculated that in France an amount of 600 million francs (£24,000,000) is yearly lost in this way. How much is lost in this way in our country has never been estimated yet. However, I am convinced that nobody has an idea how much this yearly loss amounts to here.

We commit the great mistake of building our kraals and stables in such a manner as to allow the liquid manure to escape and be lost. The liquid, however, is the best part of the manure. It would be well to catch the liquid manure in a cement tank and to pour it from time to time on the manure, which should be kept in heaps under cover.

Perhaps it would be easier and more effective to build the kraal in such a way that the longest wall is placed across the direction of the prevailing rains. In the south-west of the Cape Province, where the rains occur principally during winter—being brought by the

north-westerly winds—the longest wall should be built to run from a north-easterly to a south-westerly direction. A hanging roof should then be made which should be as long as this back wall; and in order to prevent the water falling from this roof into the kraal it should rest on the back wall, and be supported in the kraal by pillars which should be higher than the back wall. The floor of the kraal should have a fall from 1 to 50, i.e. 1 foot fall for a kraal 50 feet large, and should be made *waterproof*. This could be done by using round river-bed stones (or something similar) for building the floor, and filling the openings between the stones with a little cement and sand mixed together. The back wall of the kraal should also be waterproof, and should therefore be plastered with cement to a height of about 2 feet. If the kraal is built in this way no liquid manure can escape. The lower parts will be rather moist, but this can do no harm.

The Storage of Manure—

The words of Boussingault are still true, where he says the zeal and intelligence of a farmer can always be judged by the manner in which he treats his manure. In order to show how much manure is lost if it is exposed to the air, Müntz and Girard left a heap of sheep manure outside in the open air and weighed and analysed it from time to time. The results they obtained are given in the table below. Although the weights are given in kilogrammes (1 kilogramme = 2.2 lb.) I did not change them, as we are only interested in the relative and not in the absolute weights.

	Fresh Manure.	Same Manure after 6 months.	Loss.
Weight when wet	7160.3 kgr.	4210.0 kgr.	
Weight when dry	2341.0 „	1755.0 „	586.0 kgr. 25 per cent.
Total Nitrogen	43.7 „	38.7 „	5.0 „ 11 „
Phosphoric Acid	44.4 „	45.9 „	0.0 „ 0 „
Potash	122.4 „	96.0 „	26.4 „ 21½ „

Thus we find here a great loss of nitrogen and potash, whilst the phosphoric acid remained the same.

The nitrogen partly evaporated into the air as ammonia. It is also found in the drainage water, where all the lost potash can also be found.

As shown by the experiments of Deherain the loss of nitrogen by evaporation into the air can be prevented by continually putting fresh manure on top of the old, and by moistening the heap (under roof) often with the drainage water.

The following practical conclusions can be made from the numerous experiments of Deherain:—

1. Make the manure heap (under roof) in a spot where the soil is waterproof and slanting in order that the fluid may be able to run off into a cement hole, into which the drainage water from the stables and kraals can also be conducted.
2. Take enough suitable straw (or "bedding" or "bog" as we call it here).
3. Every morning bring the fresh manure, together with the dirty bedding, to the manure heap.
4. Spread it evenly by means of a hayfork over the manure heap.

5. Let no urine remain in the waterproof drains, but wash it out into the cement hole with water.

6. Never mix the manure with plaster of paris, sulphate of iron, or kainit, because these are unnecessary; also not with sulphuric acid or superphosphate, because these will damage the manure.

7. Moisten the manure heap often with drainage water.

The manure heap being high enough (never higher than 10 feet), it is covered with a layer of soil 6 inches thick, and remains in that position until the manure is brought into the soil.

Composition and Value—

The composition and the value of stable and kraal manure depends on three things:—

1. On the excrement and the urine of the animals.
2. On the bedding.
3. On the treatment of the manure.

Let us now shortly consider the excrement and urine of the different kinds of animals.

Pigs and cattle give a more watery manure, but greater quantities than horses and sheep. The former manure is cold and decomposes slowly, while the latter is warm and acts quickly. Much also depends on the condition of the animal. For instance, cattle which are being fattened will give a richer manure than cows in milk or work oxen. A young animal will not give as good a manure as an old one. The reason of this is obvious. In the latter case all the strength of the fodder is used for the forming of milk, for the performing of mechanical work, or for the bodily improvement and development of the young animal; while in the case of the fattened cattle a small part only of the fodder is turned into fat and remains as such in the animal, but the greatest part of the fodder leaves the body with the excrement.

The quantity of excrement which is yearly produced by stable animals has often been determined by scientists. The following figures give the average yearly production of plant food per stable animal:—

	Horse.	Cow.
Nitrogen	342 lb.	466 lb.
Phosphoric Acid ...	131 „	71 „
Potash	118 „	294 „

If we remember that one ton of nitrate of soda with 15 per cent. nitrogen, i.e. containing 300 lb. nitrogen, costs £14. 10s., then—

1 lb. nitrogen costs about 11d.;
1 lb. phosphoric acid about 32d.;
1 lb. potash about 43d.;

therefore the yearly production of excrement represents for—

	In Nitrogen.	In Phosphoric Acid.	In Potash.	Total.
1 Horse	342 × 11d. = £15 13 0	131 × 32d. = £1 15 0	118 × 43d. = £2 2 3	£19 10 9
1 Cow	466 × 11d. = £21 7 2	71 × 32d. = £0 19 0	294 × 43d. = £5 5 4	£27 11 6

If, therefore, two horses and two cows are kept stabled the whole year through enough manure should be obtained for about 6 morgen of vineyard. And if the same piece of vineyard is manured every second year, these four animals should produce enough manure for 12 morgen of vineyard of 120,000 vines at 3 ft. by 3 ft., or 54,000 vines at 4½ ft. by 4½ ft., or 43,000 vines at 5 ft. by 5 ft.

But nothing may then be lost, for from one-third to half of it is practically lost sometimes.

The urine, which often is lost for the most part, is very rich in nitrogen and also in potash. This appears clearly from the following figures. According to Boussingault the proportions of manure to urine (in stable animals) is as follows:—

	Milk Cow.	Horse.	Sheep.	Pig.
Excrement (Manure)	3½	10	1	1
Urine	1	1	1	3
Percentage of water in Manure ...	86	75	58	84

N.B.—By *manure* is meant here excrement *without urine*.

According to Andoynaud and Zacharewicz the composition of manure and urine is as follows:—

		Horse.	Cow.
In Urine	Nitrogen	15.2 per cent.	10.5 per cent.
	Phosphoric Acid...	trace.	trace.
	Potash	9.2 per cent.	13.6 per cent.
Excrement without Urine, i.e. Manure	Nitrogen	5.6 ,,	4.4 ,,
	Phosphoric Acid...	3.5 ,,	1.2 ,,
	Potash	1.0 ,,	0.4 ,,

These figures are calculated per 1000 parts urine and excrement. As a horse produces about ten times, and a cow about three and a half times, more excrement than urine, the proportions of the absolute quantities of the different kinds of plant food which these animals produce in their excrement and urine respectively are as follows:—

		Excrement.	Urine.	Percentage of Total Production present in Urine.
Horse	Nitrogen	10 × 5.6 = 56	15.2	21.4
	Phosphoric Acid ...	10 × 3.5 = 35	trace.	—
	Potash	10 × 1.0 = 10	9.2	47.2
Cow	Nitrogen	3½ × 4.4 = 15·4	10.5	40.5
	Phosphoric Acid ...	3½ × 1.2 = 4·2	trace.	—
	Potash	3½ × 0.4 = 1·4	13.6	90.7

It appears, therefore, that a total loss of all the urine from the horse means a loss of nearly half of the potash and of 0.2 of the nitrogen, while for the cow the loss would be nine-tenths and four-tenths respectively. There would be no loss of phosphoric acid.

According to Boussingault the daily production would be for a—

			Total.
Milk Cow ...	Excrement (manure) ...	62½ lb.	80½ lb.
	Urine	18 ,,	
Horse ...	Excrement (manure) ...	31 ,,	34 ,,
	Urine	3 ,,	
Sheep ...	Excrement (manure) ... Urine	49 ,,	49 ,,
Pig ...	Excrement (manure) ...	2.2 ,,	8.9 ,,
	Urine	6.7 ,,	

Let us now shortly consider the

Bedding or " Bog ".—

Everybody will understand at once that much depends on the kind of bedding which is used, as it forms an important part of the real manure. As far as I know the following material is used for bedding in our country:—Straw, bullrushes (or something similar), slangbosjes, rhenosterbosjes, vineshoots, the refuse of plants such as beans, peas, etc.

Straw, although forming the best bedding, will be too expensive for the wine farmer; he has, however, his vineshoots, of which he does not as a rule make the best use. These can be ground with a suitable machine—many of which exist in Europe—and can then be used as bedding or as fodder. In this way the plant food contained in these shoots is returned to the vineyard. The above-mentioned small shrubs form also good bedding, which should have the following properties:—

(1) A great capacity for absorption; and
(2) contain much plant food.

If bedding is first ground a little its capacity for absorption is greatly increased thereby, and it will sooner form a firm heap and rot quicker.

Finally, the value of the manure depends on its treatment, which subject we have discussed previously under the heading " The Storage of Manure ".

It now remains for me to show the *average composition* of ripe (or rotten) kraal and stable manure. Although it varies much, the following average figures can be considered as fairly reliable:—

		One ton Kraal or Stable Manure contains:
Nitrogen ...	... 4–6 per 1000	... 8–12 lb.
Phosphoric Acid	... 2–3 per 1000	.... 4– 6 lb.
Potash ...	... 5–7 per 1000	... 10–14 lb.

Here nitrogen, phosphoric acid, and potash stand in good proportion to each other, and therefore we have to do here with a complete manure. These figures refer to manure from six to twelve months' old. Fresh manure will contain less plant food *per ton of manure*, because the rotting or ripening of manure always causes a heavy loss in potash, and even heavier in nitrogen, but the quantity (that is the weight) of the manure is also decreased by nearly one-half, largely by moisture evaporation; therefore a ton of well-rotted manure contains more plant food than a ton of fresh manure. The manure should be kept as firm as possible in the kraal, and only loosened when it has to be brought to the vineyard. The bedding should be brought to the kraal in as fine a state as possible, and always one thin layer of it at a time. So soon as the manure is brought from the kraal to the vineyard it should be spread immediately and ploughed under. It should not be left lying about in the vineyard for weeks or months. Nine tons of manure per morgen of vineyard will mean one basket of manure (calculated at 30 lb.) for every six vines at 5 ft. by 5ft., or one basket between four vines every third row. This manure must be ploughed under, not too shallow, in May and June.

B.—Karoo Sheep Manure.

This manure differs from kraal or stable manure by its greater richness in plant food.

	Nitrogen.	Phosphoric Acid.	Potash.
1 ton fresh stable manure (1 year old) contains...	8 12 lb.	4 6 lb.	10 14 lb.
1 ton Karoo sheep manure contains	28 lb.	27 lb.	101 lb.

It will at once be seen from the above table that this manure is very *rich in potash*. The quantities of nitrogen and phosphoric acid also are not to be underrated.

That this manure is so rich in potash is not to be wondered at when we consider that most shrubs and grasses in the Karoo are fairly rich in potash. But there is more. The manure accumulates steadily in thick layers in the sheep kraals, where it is exposed to the hot rays of the sun, while the yearly rainfall is small. This necessarily results in the nitrogen evaporating for the greatest part into the air, while nearly all the potash remains.

This proves, however, that it would be quite wrong to use this manure *alone*. *It is not a complete manure*, as is the case with stable manure. We, therefore, must consider it as a source of potash, and add the missing quantities of nitrogen and phosphoric acid by means of other fertilizers, and in the first part of this article I have quoted the following formula:—

For one morgen of vineyard or 10,000 vines at 3 ft. by 3 ft.:—

500 lb. Government guano.
1500 lb. Karoo sheep manure.
350 lb. basic slag.

This formula contains the following quantities of plant food:—

	Nitrogen.	Phosphoric Acid.	Potash.
500 lb. Government guano	65–70 lb.	55 lb.	10 lb.
1500 lb. Karoo sheep manure	21 lb.	20 lb.	76 lb.
350 Basic slag	—	51 lb.	—
Total	86–91 lb.	126 lb.	86 lb.

Here the guano thus covers the deficiency in nitrogen, while the deficiency in phosphoric acid is covered by the basic slag

The quantity of phosphoric acid may appear unnecessarily high, but I had two reasons for adding so much. In the first instance, phosphoric acid, according to experiments made by Professor Wagner, of Darmstad, and others, exercises a favourable influence on the quality of the grapes and the wine, as also on the general condition of the vine.

In the second instance, basic slag contains nearly 40 per cent. of lime, and our vineyards are for the greatest part planted on soils which are deficient in lime. A comparative test could be made by leaving out the basic slag in one case, and by manuring a vineyard next to

the first, and completely similar in all respects, with all the constituents of the formula. After a few years one would then see what is best.

Price.—If we take one ton Government guano to cost £6, and one ton Karoo sheep manure 12s. 6d., and one ton basic slag £4, then the component parts of the above formula would cost £2. 13s. 6d.

NOTE.—From different sides I have heard, and I also have seen it personally, that vineyards which have been manured with Karoo sheep manure after some years show alkaline patches here and there. I have noticed this phenomenon in rather shallow, sandy soil, with an underlayer of clay. I can explain these alkaline patches only by supposing (*a*) that too much Karoo sheep manure has been used, and *it should be weighed;* (*b*) that the manuring took place *too late in the season.*

This should be done in May or early in winter. Further, these alkaline patches generally appeared in shallow soils, which soon get too wet in winter and too dry in summer. I again wish to point out most emphatically that it is absolutely necessary *to carefully weigh* the manure, especially the intensive kinds of manures, such as Karoo sheep manure, guano, Karoo ash, and the different artificial fertilizers.

The farmer who does not want to do this has no need of a manure formula, but he has to be satisfied with the results which he obtains, and he alone is to blame for any failures.

An excellent weighing scale is the "Truck Scale", sold by Messrs. George Findlay & Co., at Capetown, at about £5. 10s.

C.—Guano.

Guano here means Government guano of the Union of South Africa. As is well known, guano is nothing else than the excrement of millions of sea birds, found on Ichaboe, Angra Pequena, and other islands along the coast of Great Namaqualand.

Guano is also found on the three Chincha Islands along the coast of Peru, and on many other islands on the west coast of South America. As the Chincha Islands once formed the principal source for guano, the latter was generally called Peruvian guano, although these islands contain no guano now.

Guano is found in places which are frequented by sea birds, and where little or no rain occurs. In these dry areas it accumulates and remains very rich in nitrogen. In areas where it is more exposed to rains, the principal value of the guano is its great percentage of phosphoric acid (up to 33 per cent.). Unhappily the greatest part of it is not so easily available for the plant, and therefore these phosphate guanos are not so valuable as the Peruvian guano.

Towards the middle of last century great quantities of Peruvian guano were sold in Europe, as it was the only source of nitrogen for the European farmer, next to his stable manure. This Peruvian guano then contained 14 to 15 per cent. nitrogen. In 1856 the imports into Europe amounted to 342,000 tons, and in 1870 to 522,000 tons. (I am indebted for these figures and some other facts about guano to "Winkler Prins, Illustrated Encyclopedia", third edition.)

The nitrogen in guano works very rapidly, as it is mostly present in very soluble forms (ammoniacal compositions, uric acid, ureum).

Further, Peruvian guano contains 8 to 13 per cent. phosphoric acid, of which 7 to 8 per cent. is soluble in water or in a solution of ammonium citrate, and 1 to 4 per cent. potash.

Our Government guano contains on an average 13 to 14 per cent. nitrogen, 11 per cent. phosphoric acid, 2 per cent. potash. Peruvian guano is generally first treated with sulphuric acid in order to prevent loss of ammonia, and is then sold as dissolved guano.

In the west and south-west of Germany great quantities of ground guano are still bought for the manuring of vineyards under the following names:—

1. Peruvian guano No. 1, containing 7 per cent. nitrogen, 14 per cent. phosphoric acid, and 1 to 2 per cent. potash.

2. Peruvian guano No. 2, guaranteed to contain 4 per cent. nitrogen, 20 per cent. phosphoric acid, and 2 to 3 per cent. potash.

3. Dissolved Peruvian guano, containing 5 to 7 per cent. nitrogen, 10 to 11 per cent. phosphoric acid (of which 9 to 10 per cent. is soluble in water), and 1 to 2 per cent. potash.

At present the last-named sort is nearly exclusively bought (Passon, "Kleines Handwörterbuch der Agrikulturchemie", Vol. 2, page 133). It will be seen that our guano contains nearly as much potash and phosphoric acid and twice as much nitrogen as the last-named kind of guano.

To conclude, here is another extract from "Winkler Prins Encyclopedia", Vol. 8, page 546:—"Guano not only gives its own food to the plant, but by its nitrogenous components it has a decomposing effect on the soil. If, therefore, an acre contains sufficient plant food for the crop that it has to carry, the guano has the power to separate this plant food from the compound, and render it available for the plant. To this fact guano owes its reputation as a general fertilizer. It is, however, obvious that *thereby the soil gets soon exhausted,* and farmers who in the beginning get splendid results with guano, if they continue to utilize it as a fertilizer, will have to be satisfied with smaller crops, unless they add another fertilizer in sufficient quantity. For this reason guano is at present used as a supplement for an ordinary fertilizer or in conjunction with those which especially contain alkaline salts and phosphates. Furthermore, guano is very useful for improving the growth of weak and tender plants, while it also keeps insects in check."

Fish guano is prepared along the coasts of the North Sea from small fish and fish refuse (specially from sardines and whales) or from dead fishes washed ashore. These are dried and then ground. Sometimes they are steamed. Norway, where most of the fish guano is made, exported in 1876-77 about 5000 tons.

According to Müntz and Girard, fish guano contains

6 to 6.9 per cent. nitrogen.
5.5 to 13.8 per cent. phosphoric acid.
1 to 10 per cent. alkaline salts.

Thus fish guano is especially rich in nitrogen and phosphoric acid, and poor in potash. The nitrogen is very soluble, and therefore fish guano has a rapid effect.

Crayfish guano is made from crayfish refuse by treating it with steam or sulphuric acid, and then drying and grinding it. This guano contains about 11 per cent. nitrogen and 2.5 per cent. phosphoric acid. It is a good nitrogen source, and its effect is rapid.

Mr. Stewart, from the Paarl, intends to manufacture these two kinds of guano and to bring them on the market. Whether they will sell depends entirely on their price. In any case, they form excellent sources of nitrogen.

Phosphate Guano (see Phosphates).

D.—Dried Blood or Blood Meal.

This is made from blood obtained in great quantities from the abattoirs or central slaughter poles in the large cities. This blood is treated with steam in order to separate the albumen from the blood substance. At the same time the mass is continuously stirred. The liquid matter is then allowed to run off (through a false bottom), and the sediment is pressed, dried, and ground.

Another method is to add 1½ to 3 per cent, unslaked lime to the blood. This causes the blood to coagulate into a huge cake, which is dried in the air and then ground. The lime must be added gradually and the mixture continually stirred. If this is done, there will be no disagreeable smell, and no nitrogen will be lost. In no case more than 3 per cent. lime should be added, as too much lime will cause a loss in nitrogen.

In the first method a bad smell is produced. In large cities it is therefore necessary to add ferri-sulphate to the fresh blood in order to prevent these bad smells. Ferri-sulphate is obtained by mixing certain quantities of ferro-sulphate, nitrate of soda, and sulphuric acid.

Blood meal is brought on the market in the form of a reddish brown meal or as black or brownish grains. As it is not always of uniform purity and dryness, it is necessary to determine at least its nitrogenous content in order to find out its value. The percentage should be as follows:—

Nitrogen, 10 to 15 per cent.
Phosphoric acid, 0.5 to 1.5 per cent.
Potash, 0.6 to 0.8 per cent.

From 550 to 730 lb. blood meal per morgen of vineyard are used, according to its nitrogen content.

The nitrogen in blood meal acts quickly, although not as rapidly as that of nitrate of soda and sulphate of ammonia. It should be applied to the soil in May-June, and should be kept dry, because it produces ammonia if it gets moist.

The above figures show clearly that we have here a nitrogenous manure. In order to make a complete manure of it, the following formula might be employed:—

	Nitrogen.	Phosphoric Acid.	Potash.
700 lb. Blood meal (12 per cent. nitrogen) ...	84 lb.	7 lb.	5 lb.
700 lb. Fresh Karoo ash	—	23 „	87 „
600 lb. Basic slag (15 per cent. nitrogen) ...	—	90 „	...
2000 lb.	84 lb.	120 lb.	92 lb.

This formula will cost:

700 lb. Blood meal (12 per cent nitrogen) about	£2	11	0
700 lb. Fresh Karoo ash ... ... ,,	0	9	0
600 lb. Basic slag	1	4	0
Total	£4	4	0

If the basic slag be left out it will still cost £3 to manure in this way one morgen of vineyard. I calculated one ton of blood meal of 12 per cent. nitrogen at about £7. 6s.

As soon as the intended central abattoir at Capetown becomes a reality I am convinced that blood meal will be manufactured there and brought on the market.

E.—Green Manuring.

This means the ploughing under of green, succulent crops, in order to enrich the soil with humus-forming or organic matter, and also with nitrogen. The most suitable crops for this purpose are the leguminous crops, because these add considerable nitrogen to the soil by their symbiosis with the nitrogen-fixing bacteria. These plants have on their roots tubercles in which the said bacteria live and perform their work of fixing the free nitrogen of the air. Among the nitrogen-gathering leguminous plants we have lupins, peas, seradella, vetches, and clovers, whilst other nitrogen-gathering plants are yellow mustard, buckwheat, and rye.

It is therefore obvious that where leguminous crops will thrive these should be given the preference above all others for green manuring.

Green manuring is principally done on poor, light, sandy soils, but it can also be recommended for light, clay soils The crops are ploughed under when they are in full flower. In heavy, clay soils green manuring will not do much good. The principal advantages derived from green manuring are:—

(*a*) Enriching the soils with nitrogen by leguminous crops. How much nitrogen these can gather is shown in the following figures from Schultz-Lupitz. These figures give the quantities of nitrogen present in the upper and underground parts of the crops planted for green manuring per morgen of cultivated land:—

For peas	413 lb. nitrogen per morgen.
For blue lupins	352 lb. ,, ,,
For white lupins ...	339 lb. ,, ,,
For yellow lupins ...	265 lb. ,, ,,

(*b*) By the action of the roots of the green manure crops, the mineral plant food in the soil is rendered more available for the plants. In this way plant food from the sub-soil is brought into the humus.

(*c*) Weeds are kept under and the soil is kept moist.

(*d*) The green plants which are ploughed under rot rapidly in the soil, and their plant food is then present in the soil in a more available form.

The crops planted for green manuring must be manured with a little nitrogen and much potash and phosphoric acid. Different soils require different crops.

Green manuring is necessary where kraal and stable manur not available. The crops are sown in autumn and ploughed under spring as soon as they begin to flower.

Whether green manuring can be applied to our vineyards must, as far as I know, still be proved.

II.—CHEMICAL OR INORGANIC FERTILIZERS.

A.—Sulphate of Ammonia.

The principal sources for the manufacture of sulphate of ammonia are coke factories and gasworks. By heating coal and excluding air, many gases are formed, and also ammonia, which latter is removed by means of water. From the water the ammonia is extracted by heating the water with or without lime, and by binding the volatile ammonia to sulphuric acid. In 1886 the Paris gasworks used 1,000,000 tons of coal and extracted from gaswater over 8000 tons of sulphate of ammonia. Coal generally contains 1 per cent. nitrogen, which, however, is lost through ammonia. Coke factories also furnish great quantities of sulphate of ammonia. According to Winkler, this quantity can be estimated at about 68,000 tons yearly.

The sulphate of ammonia which is in the market for fertilizing purposes has generally a greyish white, greenish, and sometimes brownish colour. It should contain

(*a*) 20 to 21 per cent. nitrogen;
(*b*) little or no sulphuric acid;
(*c*) no rhodanogen nor cyanogen compounds.

The substances named under (*b*) and (*c*) are poisonous for plants, and should under no conditions be brought into the soil. Those who use sulphate of ammonia as a fertilizer must satisfy themselves on these three points when buying. They should ask a guarantee as to its purity and its nitrogen content.

Whether the plant is able to absorb the ammonia directly, or whether a previous nitrification (i.e. the changing of ammonia-nitrogen into nitrate-nitrogen) is necessary, is a question which has not been completely solved. The attentive farmer, however, will soon observe that sulphate of ammonia acts nearly as rapidly as nitrate of soda in soils which are fairly rich in lime. If they are poor in lime it works very steadily. In such cases it will be well to add, a few months before, slaked lime to the soil and plough it under, but not too deep. The lime should be ploughed under in April, and the sulphate of ammonia not before June. The slaked lime then changes in the soil into calcium carbonate or limestone, and later on forms again in conjunction with sulphate of ammonia what is called ammonia carbonate and calcium sulphate. Therefore, it would be better in this case to add ground limestone instead of slaked lime. In any case, sulphate of ammonia may never be mixed with lime It should be borne in mind that sulphate of ammonia is exclusively a nitrogen fertilizer which acts steadily in soils deficient in lime, and that the price of its nitrogen is much higher than that of the Government guano. The average price is about £18 per ton (with 20 per cent. nitrogen), while Government guano costs £6 per ton. After deduction of the value of the potash and the phosphoric acid, the nitrogen in Government guano costs less than £2. 5s. per ton of 13 to 14 per cent.

nitrogen. Therefore the same quantity of nitrogen in sulphate of ammonia costs nearly five times as much as that of Government guano.

B.—Nitrate of Soda.

The principal sources of nitrate of soda are the rainless areas in Peru, Chili, and Bolivia, especially the Province of Tarapaia and the desert of Atakama. There are found pure layers of nitrate of soda 1 to 5 feet thick. These layers are situated on an impenetrable layer of clay, and are covered by a thick and firm layer of soil 1½ to 2½ feet thick, composed of clay and sand, and mixed with other stones and salts. In some places the layers of nitrate of soda are uncovered, but generally they are covered, and then a hole is bored through the covering layer as well as through the layer of nitrate of soda until the clay layer is reached. This hole is enlarged until it is able to contain 400 lb. gunpowder. The explosion of this powder tears away great pieces of the covering layer, whereby the layer of nitrate of soda is exposed. The raw saltpetre is broken into pieces and then treated in boiling water. When the water has partly evaporated and the deposit has crystallized by cooling, the crystals are washed with cold water, and then sun-dried; this forms the commercial saltpetre.

This saltpetre contains generally 94 to 97 per cent nitrate of soda, i.e. 15.4 to 16 per cent. nitrogen. The commercial Chili saltpetre contains generally 15 to 15.5 per cent. nitrogen. As it is sold according to its nitrogen content it is of the greatest importance that the latter should be guaranteed by the seller.

Besides other ingredients, the raw saltpetre contains potassium perchlorate, which is poisonous for plants. Chili saltpetre containing one or more per cent. of perchlorate, should never be bought.

On account of its hygroscopic properties, it is generally moist, and contains 2 to 3 per cent. of water. It should, therefore, be kept in a dry place, and no greater quantities should be bought than are necessary for immediate use. Mixed with superphosphates it develops nitric vapours, which means loss of nitrogen, and this should be prevented.

As Chili saltpetre is soluble in water, and is not retained by the soil, it should be applied after the heavy rains in spring, i.e. August here with us. It acts quickly and intensively, and promotes a luxuriant growth. The presence of lime in the soil is not so necessary in this case as it is with sulphate of ammonia.

As it is easily washed out from the soil, it should always be applied for one year only. On light, sandy soils it is of little use, as it is washed out too easily.

In 1895 the export of Chili saltpetre amounted to 1,375,000 tons, and it is estimated that the saltpetrefields in South America will be exhausted in thirty years. This would be a sad prospect for the farmer if the scientists had not found out in the meantime how to fix the great quantities of nitrogen contained in the air, and make it available for plant food.

The price of Chili saltpetre (15 per cent. nitrogen) is about £14. 10s. per ton. Therefore the nitrogen contained therein costs here also more than five times as much as that in Government guano. It should always be remembered that Chili saltpetre is only a nitrogen fertilizer.

C.—Nitrate of Lime or Lime Saltpetre.

For some years past nitric acid and nitrate of lime have been manufactured in great quantities by means of electricity. The discovery how to combine the nitrogen of the air with oxygen, thus manufacturing nitric acid, was made by Birkeland and Eyde in Norway, where factories exist now, which, by means of water, are supplied with cheap electrical power. The more the methods of manufacture improve the cheaper nitrate of lime or lime saltpetre will become.

In America, Bradley and Lovejoy found out a similar method, which, however, does not give the same favourable results as the Norway method, and the factory which was erected at the Niagara Falls has already stopped working.

The nitrate of lime obtained in this way has the same favourable effect as Chili saltpetre, and therefore all depends on the price. This nitrate is also very hygroscopic (i.e. it attracts water) and must therefore be kept in a dry place.

D.—Lime Nitrogen.

When it was discovered that the saltpetrefields in South America could not last more than about thirty years every effort was made to utilize some portion of the enormous quantity of nitrogen which is known to be present in the atmosphere, and to make it available for plant food. We have already seen that it is possible by means of electric power to combine the air nitrogen with oxygen, and thereby manufacture a lime saltpetre. Lime-nitrogen is another artificial fertilizer, the nitrogen of which has been taken from the air. If air is conducted over copper shavings, heated to 400°, the oxygen is fixed, and a current of nearly pure nitrogen is obtained. This nitrogen (obtained from the air) is further conducted over red-hot calcium carbide (in melting furnaces), or it is allowed to act directly on a mixture of lime and coal in an electrical furnace.

Lime-nitrogen has the following composition, $CaCN^2$, and is therefore nothing else than calcium cyanamide.

Lime-nitrogen contains from 15 to 23 per cent. of nitrogen. In the north of Italy, where water power is easily obtainable, the Cyanide Company has erected a factory which originally was able to produce yearly 4400 tons of lime-nitrogen. In 1907 the company was, however, obliged to extend the factory, and the yearly production amounted to 20,000 tons.

In Saxony a factory has been erected for the manufacture of lime-nitrogen according to the above-mentioned methods. The nitrogen in that product costs about one penny cheaper than in Chili saltpetre and sulphate of ammonia. Lime-nitrogen must be kept dry.

This fertilizer is generally not so suitable for acid soils, containing few bacteria. In other soils, however, it acts splendidly. By the working of the bacteria, if water is present in the soil, lime-nitrogen is changed into ureum and lime. Ureum is further changed into ammonia carbonate. The bacteria which accomplish these changes are ureum-bacteria. Therefore lime-nitrogen gives excellent results on soils which have been well manured with stable manure, and therefore are rich in bacteria.

To such soils from 280 to 560 lb. lime-nitrogen can be applied. This must be done in July, when the upper layer of humus is rather

dry and cool. As it is very fine, lime-nitrogen must be mixed by half with dry soil, then spread evenly over the land and ploughed under immediately. As lime-nitrogen is only a nitrogen fertilizer, potash and phosphate must be added. The latter should be basic slag, and no acid superphosphate. Lime-nitrogen should also be bought according to its nitrogen content.

As the last source for nitrogen I wish to mention ammonia, which can now be prepared from its elements, nitrogen and hydrogen. Here the nitrogen can also be taken from the air, and hydrogen can be obtained by electrical power from water. It will, therefore, be possible by further improvements of the existing methods to procure the farmer fixed nitrogen at a much cheaper price than is possible at the present moment.

E.—Potassic Fertilizers.

The principal sources for alkaline salts are the kalium layers at Stassfurt and surrounding country. Formerly these salts were considered as of no value, and were called "Abraumsalze" (removal salts), because they had first to be removed in order to get at the enormous rock salt layers. Later on the value of these salts for agricultural purposes was discovered, and they became the principal source of potassic fertilizers. The Stassfurt salts are used over the whole world as a kalium fertilizer. They are commercially known as

1. *Kainit*, with an average of 12½ per cent. kalium (potash), is a compound salt of kalium sulphate and magnesium sulphate and chloride with crystallized water. The presence of magnesium chloride renders this salt hygroscopic, and therefore it often, if kept long, changes into a firm lump, which must be ground before it can be used. From the above it will be seen that kainit contains as much potash as fresh kraal ash. In the case of kainit, however, the unit of potash costs nearly three times as much as in the case of fresh kraal ash.

2. *Muriate of Potash (Kali) or "40 per cent. Kalifertilizer-salt"*, containing 40 per cent. kali (potash), is prepared from the raw salts from Stassfurt, and must be used only in porous soils rather rich in lime, and in such areas where there is no danger of long drought. This should always be applied in autumn (April-May).

3. *Sulphate of Potash,* with 50 to 51 per cent. potash, is obtained from kainit and from the ashes of certain sea-plants. When buying this fertilizer one must obtain a guarantee that it contains at least 50 per cent. *soluble* potash, as there are many imitations in the market. This salt acts on the lime in the soil by forming kalium carbonate and sulphuret of calcium. In granite soils and in soils poor in lime, lime should be applied from time to time if this salt is used as a potassic fertilizer.

As this salt does not contain any quantities of chloride worth mentioning, it can be used for plants which cannot stand chlorides, for instance tobacco.

In sandy soils which are deficient in humus and clay this fertilizer must not be applied too early in the season; it should be applied in the latter half of July. In other soils it can be applied in May and June.

This fertilizer contains four times as much potash as fresh kraal ash, but taken in equal quantities this potash costs twelve times as much as that of fresh kraal ash.

4. *Kraal Ash* (with about 12½ per cent. potash).—It is obtained from Karoo sheep manure by burning the latter. This ash contains potash, lime, and phosphoric acid as plant foods, of which potash is by far the most important. It is also of moment that the potash is mostly present in the form of carbonate, i.e. in the form in which it is most active and cannot easily be washed away. Therefore kraal ash can be used in soils which are deficient in lime, as is the case with many soils in our wine districts. For these reasons, not to speak of its low price, kraal ash should be given the preference above the other kali salts.

5. *Ground Granite.*—Experiments have repeatedly been made with ground kali-silicates and stones, such as granite, etc. But the costs of transport have to be considered in this case, and, further, this potash is not easily soluble, and therefore acts very slowly. It is of course difficult to say whether methods will ever be discovered to render this potash more soluble.

F.—Phosphates.

Here we have principally to do with superphosphates, basic slag, and bone meal or phosphorites. These latter are seldom found in the market, but we will give a short description of the others.

(*a*) *Superphosphates—*

The use of superphosphates dates from the observation of Justus von Liebig in 1840 that broken bones, after having first been treated with sulphuric acid, give far more rapid and better results than the same bones which have not been thus treated. It is true superphosphates are still being prepared from bones, but the great majority of superphosphates are now being obtained from mineral phosphates. These consist for the greatest part (up to 85 per cent.) of phosphoric lime, i.e. tricalcium phosphate. This is the same compound which is also found in bones. As the tricalcium phosphate is, however, not soluble in water, it must first be treated with sulphuric acid to convert it into mono-calcium phosphate, which is easily soluble in water. On this reaction the whole manufacture of superphosphate is principally based.

The mineral phosphates are being supplied from the phosphate mines in comparatively small quantities. These mines are principally situated in Algeria, Florida, and on the Christmas Islands. These mineral phosphates are ground fine between steel cylinders. A sample is taken from the fine phosphate meal for chemical analysis. From the chemical composition the quantity of sulphuric acid, diluted with the necessary amount of water which should be added to every 100 lb. of phosphate meal, is calculated. In the October issue of *De Natuur*, 1910, an interesting article appears on the preparation of superphosphates in a factory at Amsterdam, from which article I here quote some particulars. After having discussed the above calculation, the writer states in connection with the preparation of superphosphates:—

"The ingredients are mixed in an iron reservoir, in which the carefully measured amount of sulphuric acid slowly flows from a leaden tank while the weighed phosphate meal is being conveyed into the reservoir. Both of the ingredients are now mixed thoroughly for half a minute. A valve is now opened, and the half-liquid mixture flows into a great cellar. Here the chemical combination takes place.

After from four to five hours this has been completed, and the now formed superphosphate can be removed from the cellar. During that time it has become quite dry and hard. . . . The cellar is, however, not emptied before it has been completely filled by a repeatedly renewed supply from the reservoir. This happens after three hours; it then contains 60,000 kg., i.e. 66 tons of superphosphate. . . . As already stated, the superphosphate forms as soon as it is taken from the cellar a dry, hard substance. A machine now scrapes it into fine granules, and it is then brought by means of an elevator to a sieve-apparatus, which removes everything that is not fine enough yet. Taken between the fingers it is granular, not mealy nor sticky to the touch. The colour of the superphosphate is widely divergent, but this has no effect on its value. Generally it is light yellowish grey, and sometimes darkish grey. In the latter case it has been prepared from Algerian phosphate."

In Germany superphosphates are only bought according to their percentage of phosphoric acid soluble in water. Good superphosphates ordinarily contain from 15 to 19 per cent. of phosphoric acid soluble in water, and only 1½ to 2 per cent. non-soluble in water.

In the soil an appreciable quantity of soluble phosphoric acid is speedily converted into the not easily soluble form. It, however, being finely divided in the soil, the roots of the plants come into close touch with it, and consequently this otherwise not easily soluble form is speedily dissolved and absorbed by the roots. This is where the superiority of the superphosphates above all other phosphates comes in.

The phosphoric acid being more expensive in superphosphates than in all other phosphates, one is advised to be sparing with it. In acid grounds superphosphates should not be used, as other cheaper phosphates often give better results.

For vines which are a permanent crop, and can therefore in course of time profit from not easily soluble phosphates, superphosphates are not so necessary as for grain, etc., which require a speedy effect.

Superphosphates are also prepared from bones. These superphosphates are not reconverted in the soil into a less soluble form. It would, however, be foolish to pay a higher price for these on account of this than for the mineral superphosphates.

In 1899 in Germany alone about 900,000 tons of superphosphates were used for manuring purposes.

Amonia Superphosphate is prepared by mixing the calcium superphosphate with ammonia sulphate. In this way a nitrogen and a phosphoric acid fertiliser is obtained simultaneously.

"*Dissolved Bones*" contain, in addition to from 9 to 11 per cent. phosphoric acid soluble in water, also from 3 to 4 per cent. nitrogen in a not easily soluble form.

(*b*) *Basic Slag*—

As many iron ores contain up to 1 per cent. phosphoric acid, this phosphorus has to be removed from the crude iron for the manufacture of steel. For this purpose the method of Thomas and Gilchrist is generally applied. Hence the name "Thomas phosphate". The farmers here generally call it "iron guano", which name implies its origin from iron ore. The English name "basic slag" owes its name to the slags produced by the manufacture of steel, and containing

much lime, thus showing a basic (and not an acid) reaction. The superhosphates, for instance, show an acid reaction.

In the case of the basic method of steel manufacture, lime or dolomite is added to the crude or cast iron, and air is forced into the molten mass. Phosphorus and silica are thereby oxidized and get into the slag. This slag is ground fine and then sold. Basic slag is generally of a dark blue or dark grey colour, sometimes of a brownish hue. Its value depends not only on its phosphoric acid percentage, but also on its fineness.

In addition to from 10 to 12 per cent. iron oxide, basic slag also contains 40 per cent. very active lime.

Its phosphoric acid percentage varies considerably. It contains from 6 to 12 per cent. phosphoric acid. The fertilizing value of basic slag is calculated according to its percentage of phosphoric acid, which is soluble in water or in a solution of 2 per cent. of citric acid. This prevents the adulteration of basic slag with crude mineral phosphates.

For acid, and especially light sandy soils, basic slag is by far the best phosphate fertilizer. The phosphoric acid acts rather quickly in this case. This depends for the greatest part on the fineness of the meal, 75 to 80 per cent. of which should pass through a sieve No. 100.

Basic slag acts much more slowly than superphosphate, and should be applied in autumn or early in winter. The effect of its phosphoric acid soluble in citric acid is on an average estimated to be equal to 90 per cent. of the phosphoric acid soluble in water. Thus the same effect will be obtained with basic slag containing 10 per cent. of phosphoric acid soluble in citric acid as with a superphosphate containing 9 per cent. of phosphoric acid soluble in water.

I have already referred to the favourable effect of fertilizing with phosphoric acid. It should, however, be borne in mind that basic slag and other phosphates are not complete fertilizers. They should, therefore, be applied in conjunction with nitrogen and potash fertilizers.

(c) *Bone Meal*—

In this case much depends on the fineness. The action is slow but lasting. The crude material often contains from 5 to 6 per cent. of nitrogen, which acts stronger than phosphoric acid, of which generally 16 per cent. approximately is present.

G.—Lime.

The good effect of lime on the humus can be (1) plant nourishment, (2) physical, (3) chemical, and (4) bacteriological improvement of the layer of humus.

(1) *Lime as a Plant Food*—

The different crops take different quantities of lime from the soil. Lucerne takes nearly sixteen times as much lime from the soil as potatoes (respectively 466 lb. and 28 lb. per morgen). A simple calculation will show us that nearly all soils contain a sufficient quantity of lime as a plant food for a considerable time. The different phosphates will, therefore, bring sufficient lime in the soil. As a fertilization with lime has a very good effect indeed, its main influence does not lie in its nutritive value.

(2) *Lime improves the Physical and Chemical Composition of the Humus—*

Heavy, compact soils are rendered loose and porous by lime, so that air and water are better able to penetrate the soil. For heavy soils slaked lime is the best, but for light soils carbonic lime is more suitable.

By fertilization with lime the power of the soil for absorbing the principal plant foods is increased—an important factor in the fertilization with saltpetre.

(3) *Lime Increases the Chemical Processes of the Soil—*

This applies particularly to slaked lime. Especially is potash thereby converted from its non-soluble compounds into soluble forms, so that fertilization with lime can be called an indirect kali fertilization.

We have already seen that most of the kali salts only act well when there is no great deficiency of lime in the soil. As the kali salts render the soil poor in lime the kali fertilization must be accompanied by a lime fertilization. A surplus of lime in the soil is necessary in order to neutralize the acids liberated from the kali salts, as these would have a detrimental effect on the plants.

Lime is also necessary for preventing a surplus of humus acids in the soil. There sometimes arises in the soil ferro-sulphate, which is poisonous to the plants. The lime changes into ferro-hydroxide, which is soon converted into ferric-hydroxide. The latter is a valuable plant food.

(4) *Lime Increases the Activity of Bacteria in the Soil—*

This results from the lime neutralizing the acids, which would otherwise have a bad effect on the bacteria produced by themselves. This applies particularly to the nitrogen fixing bacteria. With this end in view it is better to give limestone, i.e. carbonate, in order to prevent the formation of free ammonia in the soil. It is a well-known fact that a strong nitrification takes place only in comparatively lime-free soils.

Three tons of lime per morgen of vineyard should be given early in the winter. The lime is sown broadcast and can settle into the ground with the rains or can be ploughed under.

Union Irrigation Department.

ADVICE TO FARMERS.

THE subjoined table showing the postal and telegraphic addresses of the Circle Engineers of the Irrigation Department and the districts embraced within each Irrigation Circle is published for general information in connection with Government Notice No. 274 of 1911, in terms of which engineering advice may be obtained by farmers in connection with irrigation matters.

Copies of the Government Notice above referred to, with forms of application for engineering advice, may be obtained upon application to any of the Circle Engineers or to the Acting Director of Irrigation, P.O. Box 444, Pretoria.

F. E. KANTHACK,
Acting Director of Irrigation.

CIRCLE AREAS.

CAPE CIRCLE.

Headquarters: Capetown.
Postal Address: P.O. Box 23, Capetown.
Telegraphic Address: Irrigation, Capetown.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Beaufort West, Laingsburg, Worcester, Tulbagh, Piquetberg, Malmesbury, Cape, Stellenbosch, Paarl, Caledon, Robertson, Montagu, Bredasdorp, Swellendam, Ladismith, Riversdale, Mossel Bay, George, Oudtshoorn, Prince Albert, Knysna, and part of Uniondale within Olifant's River Catchment Area.

MIDLAND CIRCLE.

Headquarters: Cradock.
Postal Address: P.O. Box 40, Cradock.
Telegraphic Address: Irrigation, Cradock.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Umzimkulu, Mount Currie, Matatiela, Mount Fletcher, Maclear, Elliot, Xalanga, Glen Grey, Queenstown, Tarka, Cradock, and part of Steynsburg and Middelburg. Whole districts of Graaff-Reinet, Murraysburg, Aberdeen, Willowmore, and part of Uniondale. Whole districts of Humansdorp, Port Elizabeth, Uitenhage, Alexandria, Bathurst, Peddie, East London, Komgha, Kentani, Willowvale, Elliotdale, Mqanduli, Ngqeleni, Port St. John, Lusikisiki, Bizana, Flag Staff, Mount Ayliff, Mount Frere, Tabankulu, Libode, Qumbu, Tsolo, Umtata, Engcobo, St. Marks, Tsomo, Nqamakwe, Idutywa, Butterworth, Stutterheim, Cathcart, Adelaide, Fort Beaufort, Stockenstroom, Kingwilliamstown, Victoria East, Albany, Bedford, Somerset East, Jansenville, and Steytlerville.

UPPER ORANGE RIVER CIRCLE.

Headquarters: Bloemfontein.
Postal Address: P.O. Box 528, Bloemfontein.
Telegraphic Address: Cirgate, Bloemfontein.
Boundaries of Circle and Fiscal Districts included in same: Railway line and from Bloemfontein along watershed between Modder and Riet Rivers to junction and along Riet River, including both banks, to junction with Vaal. Whole districts of Herbert, Hopetown, Philipstown, Hanover, and area south of Orange River within its catchment, including part of Middelburg, Steynsburg, Molteno, Wodehouse, and whole districts of Barkly East, Herschel, Rouxville, Wepener, part of Ladybrand, Thaba 'Nchu, and Bloemfontein, south of railway line, also part of Bloemfontein and Fauresmith and Jacobsdal south of catchment between Modder and Riet Rivers. Whole districts of Phillippolis, Colesberg, Albert, Aliwal North, Smithfield, Edenburg, and Bethulie.

LOWER ORANGE RIVER CIRCLE.

Headquarters: Capetown.
Postal Address: P.O. Box 23, Capetown.
Telegraphic Address: Aqua, Capetown.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Griqualand, Gordonia, Kenhardt, Namaqualand, Port Nolloth, Van Rhynsdorp, Clanwilliam, Ceres, Sutherland, Fraserburg, Carnarvon, Victoria West, Richmond, Britstown, Prieska, and Calvinia.

POTCHEFSTROOM CIRCLE.

Headquarters: Potchefstroom.
Postal Address: P.O. Box 78, Potchefstroom.
Telegraphic Address: Irrigation, Potchefstroom.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Marico, Mafeking, Vryburg, Kuruman, Taungs, Wolmaransstad, Potchefstroom, Witwatersrand, and Lichtenburg.

STANDERTON CIRCLE.

Headquarters: Standerton.
Postal Address: P.O. Box 162, Standerton.
Telegraphic Address: Irrigation, Standerton.
Boundaries of Circle and Fiscal Districts included in same: Ermelo, Standerton, Heidelberg, and Wakkerstroom.

PRETORIA CIRCLE.

Headquarters: Pretoria.
Postal Address: P.O. Box 444, Pretoria.
Telegraphic Address: Circle, Pretoria.
Boundaries of Circle and Fiscal Districts included in same: Zoutpansberg, Waterberg, Rustenburg, Pretoria, Middelburg, Barberton, and Lydenburg.

NATAL CIRCLE.

Headquarters: Pietermaritzburg.
Postal Address: P.O. Box 344, Pietermaritzburg.
Telegraphic Address: Irrigation, Maritzburg.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Ingwavuma, Ubombo, Ngotshe, Paul Pietersburg, Vryheid, Utrecht, Newcastle, Dundee, Klip River, Upper Tugela, Estcourt, Impendhle, Underberg, Ipolela, Ixopo, Alfred, Lower Umzimkulu, Alexandra, Umluzi, Inanda, Lower Tugela, Umlalazi, Umfolozi, Hlabisa, Ndwandwe, Mahlabatini, Ngutu, Babanango, Nkandhla, Entonjaneni, Eshowe, Mapamulo, Krantzkop, Umsinga, Weenen, Umvoti, New Hanover, Indwedwe, Umgeni, Pietermaritzburg, Camperdown.

ORANGE FREE STATE CIRCLE.

Headquarters: Bloemfontein.
Postal Address: P.O. Box 528, Bloemfontein.
Telegraphic Address: Bloemfontein.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Vrede, Frankfort, Heilbron, Vredefort, Kroonstad, Hoopstad, Boshoff, Barkley West, Kimberley, and part of Jacobsdal, Fauresmith, and Bloemfontein, north of catchment between Modder and Riet Rivers, also part of Bloemfontein, Thaba 'Nchu, Ladybrand, north of railway line. Whole districts of Ficksburg, Bethlehem, Harrismith, Lindley, Senekal, and Winburg.

The Distribution of Temperature.

TRANSVAAL, ORANGE FREE STATE, AND NATAL.

THE following note on the distribution of temperature over the Transvaal and parts of Natal and the Orange Free State has been kindly furnished by Mr. R. T. A. Innes, the Director of the Transvaal Observatory, Johannesburg, in response to an inquiry from a correspondent. Mr. Innes remarks that his information as to the temperatures experienced in Natal and the Orange Free State is derived from reports published in those Provinces, and is rather limited.

As regards the distribution of temperature over the Transvaal Province (Mr. Innes writes), the coldest districts are Bethal, Standerton, Ermelo, Wakkerstroon, and the neighbourhood of Belfast.

This fact is well shown by the following table in which is given the annual mean temperature, the average maximum temperature, the average minimum temperature recorded during the year, and also the lowest for various places in the Transvaal, and also for Utrecht in Natal.

It will be noticed from this table that the temperature distribution over the Transvaal is very uniform, but changes with altitude. Thus: Potchefstroom, Zeerust, Pretoria, Pietersburg, and Piet Retief have very nearly the same temperature conditions; their altitudes lie between 3940 and 4430 feet. In quite a different class are Belfast, Bethal, Ermelo, Standerton, and Wakkerstroom. Here the mean annual temperature is about 5 degrees lower than that of the previously mentioned places, and the absolute minimum temperatures are much lower; the altitudes of these "colder" districts range from 5000 to 6000 feet roughly.

The temperature conditions at Piet Retief are very similar to those prevailing at Pietersburg, and it will be noticed that the altitudes of the two places are almost equal.

The altitude above sea-level of the Piet Retief District decreases very rapidly from west towards east. The western border of the district is almost 5000 feet above sea-level, whereas the east is below 2000 feet. Temperature conditions will accordingly change considerably across the district; frosts will be of frequent occurrence on the high levels, but very rare on the low ground.

Similar conditions will prevail over the Vryheid District, where frosts occasionally occur, but are rare.

The Vredefort District of the Orange Free State (P.O. Greenlands is in this area) has temperature conditions of the type prevailing over Standerton and Ermelo; short spells of very severe weather may be expected to occur two or three times a year between the months of June and September.

In brief, a farmer living on the high veld above the 4000-feet level in the Transvaal and Orange Free State must anticipate and be prepared for occasional spells of extremely cold weather, but if he would avoid these he must go down to lower levels in such districts as Piet Retief, Vryheid, or Swaziland.

Above the 4000-feet level the winter temperatures by night and early morning will generally be too low to permit cattle to thrive if left in the open.

TABLE SHOWING ANNUAL MEAN TEMPERATURE, AVERAGE MAXIMUM TEMPERATURE, AVERAGE MINIMUM TEMPERATURE, AND ALSO THE LOWEST, RECORDED DURING 1909–10 FOR VARIOUS PLACES IN THE TRANSVAAL, AND ALSO FOR UTRECHT IN NATAL.

Year 1909–10.	Potchefstroom.	Zeerust.	Pretoria.	Pietersburg.	Belfast.	Bethal.	Standerton.	Ermelo.	Wakkerstroom.	Piet Retief.	Vryheid (Natal).
	°	°	°	°	°	°	°	°	°	°	°
Mean annual temperature	62·5	64·3	63·5	63·4	65·1	57·9	57·1	58·3	56·3	62·1	66·4
Average maximum temperature	77·4	78·7	77·9	76·9	67·2	71·3	73·0	71·8	69·5	73·9	81·0
Average minimum temperature	47·6	49·8	49·0	49·9	43·0	44·5	41·1	44·8	43·0	50·3	51·8
Highest recorded during year	93·8	96·9	94·1	95·9	84·0	86·2	88·0	87·0	86·0	93·9	101·0
Lowest recorded during year	21·0	21·9	25·2	29·0	18·2	15·0	13·0	17·0	24·0	29·0	32·0
Altitude	4430	3940	4387	4130	6295	5200	4988	5570	5500	4000	—

Western Province Agricultural Society.

FOURTH EGG-LAYING COMPETITION.

16th May, 1911, to 15th May, 1912.

Record for JUNE, 1911, and Totals to end of JUNE.

Pen Number.	Owner.	Breed. (Six Birds to a Pen.)	Record for Month. Eggs.	Weight. oz. dwts.		Total to Date. Eggs.	Weight. oz. dwts.		Position to Date.
1	F. W. Nicholson..	Buff Orpingtons..............	—	—		—	—		—
2	F. T. Hobbs	Silver Wyandottes............	16	28	11	25	44	8	17th
3	A. Riley.........	Black Minorcas (R.C.)........	14	23	0	27	44	4	18th
4	N. Cole	White Leghorns (Amer.)	9	17	14	10	19	12	22nd
5	S. T. Jones	White Leghorns (Amer.)	20	40	14	30	60	14	12th
6	H. Curtis..	White Leghorns (Amer.)	12	31	9	32	68	6	9th
7	S. C. Skaife......	White Wyandottes............	—	—		—	—		—
8	A. Keppie.......	White Wyandottes............	29	51	15	41	72	14	8th
9	S. A. West.......	White Leghorns (Amer.-Danish)	14	27	10	14	27	10	19th
10	H. H. Bright.....	Black Leghorns	33	64	0	33	64	0	11th
11	B. Kauffmann ...	Brown Leghorns	—	—		11	23	1	21st
12	B. Kauffmann ...	Black Leghorns	29	61	11	43	88	8	7th
13	C. W. Pilkington .	Rhode Island Reds	11	26	14	19	45	12	16th
14	W. P. Cowan	White Leghorns (Eng.)........	47	81	10	54	93	0	6th
15	A. J. Stacy.......	White Leghorns (Aust.-Amer.) (Re-entered from last competition for second year test.)	20	44	11	29	65	8	10th
16	B. Kauffmann ...	White Leghorns (Eng.-Amer.)..	47	92	2	90	177	8	1st
17	S. Smith	Brown Leghorns	7	12	8	13	23	1	21st
18	Mrs. H. H. Bright	White Leghorns (Aust.).......	7	12	12	7	12	12	23rd
19	N. Cole	Brown Leghorns	28	61	11	47	101	11	5th
20	F. Molteno	White Leghorns (Amer.)	26	46	0	28	49	8	13th
21	C. H. van Breda..	White Leghorns (Aust.)	49	94	12	84	158	3	3rd
22	Mrs. C. H. van Breda	White Leghorns (Amer.).......	45	90	9	68	132	14	4th
23	S. A. West.......	Brown Leghorns	19	35	2	25	46	12	15th
24	Graham, Hope & Co.	White Wyandottes	13	25	6	13	25	6	20th
25	R. V. R. Jones ...	White Leghorns (Amer.-Aust.) .	4	7	15	4	7	15	24th
26	S. Smith	White Leghorns (Dan. & Amer.)	49	92	2	90	167	8	2nd

MANAGER'S REPORT FOR JUNE, 1911.

I regret to have to report a falling off in the number of eggs at a total of 548 for the month, as against 289 for the first fortnight of the competition (16th to 31st May). In my opinion the reasons for this are :—(1) The sudden and frequent changes, both in temperature and weather; (2) several birds that were laying well going into a partial moult; (3) it was found necessary to fix wooden screens to prevent the rain driving into the houses which took several days; (4) I was absent on the sick list for a week. The two latter reasons were alone sufficient to cause a drop in the number of eggs, for we all know what sensitive creatures fowls are, and how any alteration in their surroundings or the presence of strangers about them affects them. Another possible contributing cause is the fact that the pens are surrounded by oak trees from which are constantly falling small buds (especially at this time of the year), and to these the birds seem very partial; it may be that some substance in these, possibly a vegetable alkaloid, has a detrimental effect on the ovaries—they certainly give to the droppings a reddish-brown colour, such as tannin or gall would, both of which we know are strong astringents. The fact that some years ago I was able to prove beyond doubt that the consumption of beech-nuts by fowls had a detrimental effect on the egg yield, and gave to the yolks of the eggs the colour of varnish, leads me to entertain this suspicion. The Government Analytical Department has kindly promised to make an analysis of these oak tree buds, and it will be interesting to learn the result.

Seventy-nine birds have started to lay; two pens have still no eggs to their credit, although they are in the best of health.

Some of the birds which were not fully matured on arrival have come on very quickly; a few have started to lay, while others should do so any day now. In several pens three, four, and five birds have laid well, while their partners have failed to contribute a single egg, which bears out an opinion I have always held, that success in a laying competition is not due entirely to a good laying strain, but in a great degree to selecting the right birds from a flock of likely and well-bred pullets, and it is well to aim to have them just commencing to lay when they enter.

The total number of eggs for the month is 548, weighing 1081 ounces. The size of the eggs continues good, only one this month being under $1\frac{1}{2}$ ounces. Two double-yolked eggs have been laid by No. 68, each weighing 2 ounces 10 drams, and by No. 124 one, also 2 ounces 10 drams.

Special mention should be made of No. 89 in Pen No. 15, an Australian-American leghorn in her second year. The total number of eggs to her credit for the six weeks is twenty-seven, weighing 61 ounces 3 drams (she always lays an egg well over 2 ounces), and yet she is gradually going through her moult, and will now soon be over it. Such a bird is invaluable as the foundation of a strain of good layers of large eggs.

The six birds that have laid the highest number of eggs for the month are:—Nos. 83 (eighteen), 89 (eighteen), 43 (seventeen), 81 (seventeen), 151 (seventeen), and 91 (sixteen); and up to date, 43 (twenty-nine), 89 (twenty-seven), 91 (twenty-five), 31 (twenty-three), 151 (twenty-two), and 11 and 156 (twenty-one). The six with the greatest weight for the month are:—Nos. 89 (40 ounces 6 drams), 151 (31 ounces 12 drams), 83 (31 ounces 2 drams), 43 (30 ounces 14 drams), 91 (28 ounces 9 drams), 112 (28 ounces 4 drams); and up to date, 89 (61 ounces 3 drams), 43 (51 ounces 12 drams), 30 (47 ounces 4 drams), 73 (45 ounces 12 drams), 91 (44 ounces 14 drams), and 96 (44 ounces 3 drams).

The health of the birds continues good. Nos. 98, 99, 120, 121, and 128 developed slight colds (No. 121 with a little emphysema), which were treated and cured at once. The secret, as every poultry breeder knows, is to spot this or any ailment at once, and treat at once, and so often a vast amount of trouble is saved. No. 151 developed lameness due to rheumatism of the left hock joint, which after three days' treatment disappeared. Nos. 82, 98, 108, 117, 127, 129, 152, 61, 62, 63, 64, 65, 66, 109, 110, and 111 are going through a partial moult, No. 89 through a full one, and Nos. 139, 140, 141, 142, and 143, which started a full moult shortly after arrival, are practically over it. This going into a partial moult is a great drawback to good egg records; I can only account for it as being due to the unseasonable and changeable weather. Each bird is treated at once to bring it through as quickly as possible.

The weather during the past week of the month was dull, cloudy, and damp, ending in heavy rain accompanied by north-west wind. Half the second week was hot and sultry, the other half dull and wet with north-west wind, and the nights very cold. The third week was fine and warm. The first part of the fourth, dull and wet with a cold south-east wind and the nights again very cold; during the remainder the days were fine, warm, and sunny, but becoming cold and rather damp as soon as the sun went down. Thus it will be noticed that the birds have experienced many changes in the weather and temperature, always a greater drawback to a heavy egg yield and good health than even continuous, very cold dry weather.

Correspondence.

This section will be set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture will be particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria", and written on one side of the paper only.

INTRODUCTION OF TEFF GRASS.

To the EDITOR of the *Agricultural Journal.*

SIR,—I am sorry if I erred in my article in your April issue by claiming for our Botanist, Mr. Burtt-Davy, the honour of bringing this valuable grass to South Africa. I should have used the words "The Transvaal" instead of "South Africa"; we are so readily falling into the habit of thinking in terms of the Union that we are apt to forget our recent provincialism. The evidence led by the Director of the Natal Botanic Gardens is quite convincing, but, admitting that seed was introduced into Natal in 1887, I maintain that all trace of that seed has been lost, and it is from the few pounds distributed by Mr. Burtt-Davy in 1903 that so many thousands of tons of grass is now grown and so many head of hungry stock wintered on this nutritious forage. There is an old saying that the man who causes two blades of grass to grow where only one grew before has been of some benefit to humanity—and I say *palmam qui meruit ferat.*

It gives me great pleasure to repeat my offer of a package of seed for experimental purposes to any farmer in the Union who sends me sufficient stamps to defray postage, and I hope next year to be in a position to extend this offer to *Phalaris bulbosa,* another grass with which I am delighted.—Yours, etc.,

J. WENTWORTH-SYKES.

Grasslands, Natal Spruit, Transvaal.

BEE-KEEPERS' EXAMINATIONS.

To the EDITOR of the *Agricultural Journal.*

SIR,—As Mr. Chesterfield, the hon. secretary of the South African Bee-Keepers' Association, is evidently not very well informed regarding the examination of the two candidates referred to for expert certificates, kindly allow me to enlighten him on the subject, at least as far as I am personally concerned.

As no Bee-Keepers' Associations in South Africa were affiliated with the British Bee-Keepers' Association, it was therefore impossible for them to conduct examinations in this country. Inquiries made elicited the fact that there were only three certificated experts in South Africa, the nearest being Mrs. Stuart Russel, of Silverton. I then became a member of the British Bee-Keepers' Association, and it was arranged that Mr. J. L. Taylor (the other candidate) and myself be examined by Mrs. Russel. The examination took place in the presence of several persons and was openly conducted at Silverton. Now, Mr. Chesterfield is in error in saying that the examination was conducted so quietly that until it had taken place the Pretoria Association, as an association, had no knowledge of it. This is not a fact, as I will show. At a general meeting, at which Mr. Attridge was chairman, I announced to the meeting that I was being examined by Mrs. Russel, so that it was no secret or surprise to the Association.

At the same meeting I read extracts from a letter received from the Secretary of the British Bee-Keepers' Association, stating that they would be pleased to accept the Pretoria and District Bee-Keepers' Association in affiliation and that the fee would be £1. 1s. Before the meeting concluded it was unanimously resolved to apply for affiliation by the first outgoing mail, and that is how the first association in South Africa became affiliated with the parent body.

Regarding the Pretoria and District Bee-Keepers' Association being a purely local body, I may say that I enrolled more than 25 per cent. of its members, and therefore know that all are not residents of town or district.

Thanking you in anticipation for the insertion of this,—Yours, etc.,

Pretoria. D. CAIRNCROSS.

To the EDITOR of the *Agricultural Journal.*

SIR,—I regret troubling you again on this matter, but it does appear that I am a "bit mixed", now that so many have tried to enlighten me. It all happened this way. I read some time ago of the formation of the *Transvaal* Bee-keepers' Association, and when I noticed later a Mr. L. L. Hardwick writing as Hon. Sec., *South African* Bee-keepers' Association (Western Province), I naturally wondered if this could be a Cape Province Institution or another of our Northern Mushrooms. And now I am not enlightened enough to understand, seeing that a Mr. A. J. Chesterfield is the Hon. Sec. of the latter, and a Mr. F. Sworder or Mr. Blower of the former, with another provincial association thrown in; so of course I have now made up my mind that I cannot know everything and everybody, and so return to the *Examinations* and ask any of my kind informants if it is possible to get some forms of the examination papers as a guide to preparing oneself for such; for though my lifetime of bee-keeping and study (am over fifty now) has taught me many a secret a keen observer picks up, I may not be up to date (in the bee line one must keep going to get there) enough for the South African Bee-keepers' Association's Expert's Certificate; therefore I will be indebted to my best informed informants for such a form.

Thanks for the information already in hand through your kindness, and in anticipation for this which will be of great use to my friends here.—Yours, etc.,

Cape Province, 29th July, 1911. ICHNEUMON.

SUGGESTED CURE FOR CHICKEN-POX.

To the EDITOR of the *Agricultural Journal.*

SIR,—For the benefit of some of your correspondents who are inquiring for a cure for chicken-pox in poultry, I would like to recommend a cure that I have found very effective:—

1 oz. pure carbolic oil;
2 oz. camphor;

to be mixed together and bottled.

Mix thirty drops of the above with a sixpenny jar of vaseline and apply to the affected parts.

If this is done no isolation of the birds will be found necessary, and one application will generally be sufficient.

With this cure on hand chicken-pox need have no terrors for any one.—Yours, etc.,

Dewstone, Durban Road, Maritzburg. J. S. CLARKSON.

[The Department has not tried the above remedy and so is not in a position to express an opinion as to its merits, except to say that it appears to be quite safe to use.—Editor, *Agricultural Journal.*]

DATE CULTURE AT VAN RHYNSDORP.

To the EDITOR of the *Agricultural Journal.*

SIR,—I see in your issue for July, 1911, Mr. Gerard Rood, Van Rhynsdorp, Cape Province, asks the way for preserving dates.

The following should be some guide for him.

It is very rarely that all the dates on a bunch ripen at the same time; those which ripen first should be hand-picked, for if some are dead-ripe and some half-ripe at the time of curing or preserving they will not be uniform; that probably is the cause of Mr. Rood not getting his dates to keep. When the remainder of the bunch is beginning to ripen nicely cut it off, and hang it up in a dry and shady place. Remove any dates which are beginning to spoil before the bunches are hung up. It, however, greatly depends on the kind of date. The above has to do with a dry date, such as Deglet Noor. The dates must be allowed to dry thoroughly, often some weeks, according to kind. When thoroughly dry be sure to pack really tightly, as they keep better and prevent the natural moisture from drying out. They should keep years if properly handled. I know the district well, and should strongly advise planting large quantities, but be careful to plant good varieties, not rubbish, and only get the best.—Yours, etc.,

T. S. WATKINSON.

Cairn Siding, Nelspruit.

STOCK SALES IN SOUTH AFRICA.

To the Editor of the *Agricultural Journal*.

Sir,—In the *Agricultural Journal* for May I notice a letter from Mr. P. G. Leonard, of Kokstad, East Griqualand, on the subject of central stud stock sales.

It may interest some of your readers to know that the Central Agricultural Society of this Province will now hold a stud stock sale on the day after their annual show. The sale after the 1911 show was so markedly successful that entries are already being received for our sale, which will take place on the 19th or 20th of April, 1912.

Regarding the procedure in taking entries it has been decided to give stud-book stock precedence, and book in order of entry. Grade stock will be sold afterwards, also in order of entry.

This sale takes place on the Agricultural Show Ground, Bloemfontein, and the show ground has a railway siding.

I shall be pleased to supply any further information, and, when published, catalogues of the sale to correspondents.—Yours, etc.,

C. McG. Johnston,

P.O. Box 377, Bloemfontein. *Secretary, Central Agricultural Society, O F.S.*

RAT EXTERMINATION.

To the Editor of the *Agricultural Journal*.

Sir,—Adverting to the articles by Messrs. Eagle and Bradfield on the above-mentioned subject I wish to state that I have tried all sorts of poisons, very effective in most cases, except in the case of the longtail rat. I tried pumpkin pips; they were good, but not quite effective. You see this fellow is as cute as the devil himself. A medical doctor then gave me the following advice, with good results. Take plaster of paris, mix half-and-half with flour, and place it in a spot which they are sure to get to; alongside of it put a receptacle with water. The next morning your heart will rejoice, whereas theirs will be cold in death. The next night remove the mixture to another spot; do not leave it for two nights in the same place. These fellows are socialists, and the moment they come across something nice the rest of the tribe is informed, and they say: " Let us eat and drink, etc. ", with the result that a brick is formed inside, and their days are numbered. On the other hand they seem to know by instinct that death lurks there, and they go and look for pastures new, and that you must provide for also.—Yours, etc.,

Pretoria. Gid. F. Joubert.

BLUE GUM ROOTS.

To the Editor of the *Agricultural Journal*.

Sir,—In your last issue is a letter asking for information how to get rid of the extension of the roots of the blue gum tree, to which an answer was given, on expert authority, to remove the tree. Though I am not an expert, allow me to state facts of my own experience and a practice I have adopted with absolute success during the last forty-five years.

Where there are many trees and the owner can afford to lose one or more, then by all means uproot the tree, but where there are, as in most cases, few trees it is a great pity to remove them. Of all known trees there is none so healthy and so cooling as the gum. The oak is a cooling tree, provided there is a slight breeze or the trees are far apart, but the gum is cooling on the hottest day, though far or near apart and no breeze. It averts also fever, and wherever there is a gum there is no fever. This has been abundantly proved where the gum has been planted in marshy places and in fever beds. Rather than uproot the tree, adopt my suggestion. If the tree is too near a dwelling, or too near a fountain, or spread too far into your flower garden, cut a trench of about a spade broad and about two feet deep near the wall of the dwelling or of the spring or garden or any other spot you do not wish the roots to be; cut off the roots and leave the trench open for a month or six weeks; then put a sheet or sheets of corrugated iron in the trench *against the roots* and fill up the trench. In the meantime the roots abutting on the iron will either turn round towards the stem of the tree, or at any rate in the opposite direction away from the iron; but as at the joints of two or more sheets of iron rootlets might get through, to prevent this, or to remove them, open the trench at the end of every twelve months and cut off the new rootlets. There will be very few, still there may be some. The expense to see to this annually is a very trifling matter. The tree is preserved and its use and comfort also. Do the same with all other trees whose roots spread out far, such as the Kei-apple, the fir, the monotokko, and all other long-spreading roots. Where the soil is deep the roots of all those trees would rather go down than spread, but where the soil is shallow and poor the roots spread on the surface. Let your correspondent try my suggestion, and I shall be surprised to hear of his non-success.—Yours, etc.,

Capetown, 5th July, 1911. Austro-Africano.

TEOSINTE.

To the EDITOR of the *Agricultural Journal.*

SIR,—Three years ago having a piece of land which I found too poor to grow anything on, I decided, as a last resort, to plant with a little teosinte, and, if that failed too, to give it up as a bad job. However, the teosinte did grow, and grew wonderfully, so I kept the seed and planted it again the next season, and produced a crop on the same land, without a particle of manure, standing 7 to 9 ft. high. All during the growing season I kept cutting it down and feeding my pigs with same. I cut all of it down three times before letting it go to seed, and some of it was cut five times. The months of November, December, and January I fed the pigs on nothing else. I was so pleased with the result of the crop that I wrote an article on it in the Agricultural Section of the *Natal Mercury.* Now, this last summer being so dry I did not expect much from the teosinte field, but, although planted on the same ground, except that I had increased the field by several acres and without a bit of manure or fertilizer of any sort, it came on with the new year and produced a splendid crop.

It is a magnificent fodder crop, for it stools out tremendously and, if planted in rows 3 ft. apart and 12 in. in the rows, it will grow so thick that it is impossible to walk through it. It is suitable for all stock, from ostriches and pigs to racehorses. In Mexico and Central America it is largely grown for hay; in Australia it is now being grown for ensilage, as it is considered unequalled, and in a report I received from a director of agriculture in Australia he stated that (to quote his words) "As a fodder crop it is equal, if not superior, to lucerne".

It is so easy to grow that every one ought to give it a trial.

Plant it in rows as previously stated, weed it once, and you will not need to weed it again.

When it first comes up it looks just like small mealies. Where there is little or no frost, the earlier it is planted the better. Here, on the coast, I plant the last week in July or first week in August, and can go on planting right up to the end of December. Up-country do not attempt to save for seed, for the seed does not ripen until May and June, and naturally it would be killed by frost. The plant will stand about three degrees of frost, but no more. Plant the same time as the first mealies after frost for up-country districts. It responds readily to superphosphate. The plant carries a very high percentage of nitrogen, and just before tasselling the stalks are quite sweet.

The seed can be obtained from most seedsmen, but Samuel Deane, of Durban, is handling large supplies of the seed this season, retailing at 1s. per lb., and large orders considerably less in price. One does not like mentioning the name of a person or firm in an article of this sort, for it savours of cheap advertising, but, speaking from my own experience, I have often wished when reading an agricultural paper that the place where a particular seed or implement could be obtained had been mentioned so that I could write direct and save time.

When sowing teosinte, use from 10 to 12 lb. and put from four to seven seeds in each hole, planting same depth as mealies. From my own experience it is not necessary to soak the seeds, for I find they germinate, if anything, faster than mealies.—Yours, etc.,

South Coast, Natal. "TEOSINTE."

SCAB: ITS NATURE AND TREATMENT.

To the EDITOR of the *Agricultural Journal.*

SIR,—I have read with much interest Mr. A. G. Davison's paper on "Scab: Its Nature and Treatment", read before the Vryburg Farmers' Association and published in the June number of your *Journal.* His experiments with an old infected kraal conducted between August, 1906, and August, 1909, go to prove beyond doubt that the scab *acari* or its eggs retain their vitality for a period of three years, either in the dung or kraal fence or wall. I am rather inclined to the opinion that the insect is capable of not merely living, but breeding in the loose dung. Of course, the dung is not its natural host, and three years may be the limit of its existence under such conditions. But this is not my point. If old kraals and sleeping-places retain the infection for so long a time, how is it possible to clean the country of scab? The recommendation to destroy old kraals and provide clean veld would be right enough if such could be effectually done. Why not use the sheep as a collector of the scab insect, the same as cattle are used to collect ticks? That this can be effectually done I am fully convinced, and will give a few instances to back my opinion. In 1866 I moved on to a farm in the Komgha District. All my neighbours were Dutchmen, all had sheep, and all had scab, some of them to perfection. My sheep were clean, for I had been guided by Yoxett's work on sheep, and had come from a farm near the coast where there were no others farming with sheep. There were no fences in those days; sheep had to be herded and kraaled at night. Sheep mixed while in the veld

and my sheep were soon infected with scab, so I built a dipping tank at once. It was only a wooden one, about fifteen feet in length, but it answered my purpose well There were no patent dips then, but both Boer and Kaffir tobacco were to be had. A thirty or a thirty-five gallon soap pot served to boil the tobacco, bringing it just to the boiling point and then covering it up. Half-yearly shearing was the rule in those days, and after each shearing my sheep were dipped twice; and this tobacco dipping was kept up till Dr. Roe's formula for sulphur and lime was published in the late Mr. Hellier's little paper, the "Farm". I was on that farm for seven years; the same kraals had to be used always, yet my sheep kept fairly clean. If I saw a spot of scab it was attended to at once. There was no reason to suspect at any time that my kraals were a source of infection. The intervals between the dipping served to pick up the stray mites in the loose dung, and no doubt there are always plenty of them where sheep are kraaled. On one occasion a neighbour came over while I was shearing, and expressed astonishment at the quantity of wool I was getting from my limited flock. My reply to him was, "You only shear half a sheep"—the remainder of his wool was scratched off in the veld. In 1889 there was a severe drought, and when the rains came late in the spring there was a severe outbreak of scab in one of my flocks. We knew where it had come from, as I had cut the throat of one scabby ewe—a stranger—and subsequently found another in the infected flock. Two dippings cured those sheep. All my sheep had to come to the same kraal for drafting, etc.—of course they were not kraaled at night, as the farms were fenced—but sheep had to go back on to their own veld, which must have been infected more or less. At one time it was found that the sheep inspectors' areas were too large, so inspectors were appointed for wards. One of my sons was so appointed for two wards. In his area were a number of farms along the Great Kei River, very difficult of approach; one or two had never before been visited by a sheep inspector, and sheep were very scabby. There was a dipping tank, and he lived amongst those sheep till he was satisfied that he had cleansed them; and for two years those sheep remained clean: most of them, I believe, had three dippings. But this goes to prove that the sheep will themselves collect the mites between the first and the second dipping. My nephew, who was in charge of my sheep at Oribe for several years, maintained that with one thorough dipping in lime and sulphur he could cure scab. I had no reason to doubt him, although we always dipped twice. The sheep he was in charge of travelled in both autumn and spring, and although we could keep them clean on the farms, they always picked up scab on the road. Any spot of scab that showed itself when they came down in the autumn was carefully soaked in a strong solution of tobacco extract, and those sheep would return in the spring apparently clean, but before shearing spots of scab would show. These spots were at once treated with tobacco extract; hence the cure with the one dipping, although I never allowed him to trust to it. This was, of course, prior to 1887. I trust that I have made out a case for using the sheep themselves to cleanse both veld and the kraals.—Yours, etc.,

Kei Road, 5th July. R. WARREN.

STEAM PLOUGHING AND THE MAIZE INDUSTRY.

To the EDITOR of the *Agricultural Journal.*

SIR,—Seating myself this evening in an easy chair after a day in the mealie lands, I picked up the last issue of the South African *Agricultural Journal* and turned to an article headed "Steam Ploughing and the Maize Industry". Well, Mr. Editor, even to the "small farmer" there is a certain amount of interest in the article—quite friendly interest up to a certain point; but towards the end the ideas and opinions set forth on page 99 nearly made me jump out of that comfortable easy chair. Presumably your correspondent wishes to be taken seriously, and I am forced to the conclusion that he has but little knowledge of his subject, so far as the maize industry is concerned, and in defence of the "small farmer's" intelligence, methods, and industry I raise a voice in protest. I must plead the general need of refuting such inaccurate statements and opinions as those set forth by your contributor as my excuse for asking space in your correspondence column for controversial matter.

Presuming that I represent the "small farmer" and mealie-grower class, like thousands of others in South Africa, in that I do not use the steam plough, I, notwithstanding, take strong exception to the ideas set forth on page 99, paragraphs 4, 5, 6, 7, and 8.

Take the first, viz. par. No. 4, commencing "While believing that we, etc."

Well, if Mr. Leonard Acutt is not hopeful that the thousand and one of us small farmers will be a large factor in the future production of maize in South Africa, I, on the contrary, for one, hold the opinion that the multiplicity of "small farmers" (this term meaning any and all of us who do not use the steam plough) is going to be *the* factor in the case. Of course, as the writer says, Vereeniging methods are necessary for Vereeniging results—very true and very logical—but which system, the big man's or the small man's, is going

to be responsible for the bulk of the estimated Transvaal yield this year, viz. 2,394,640 bags? And I base my opinion on the workings of the world's greatest maize-producing country—the United States of America. What of the producers of the 5,535,611 farms of the United States of America (see *American Farm Journal*, July, 1911, page 400) and the 1,336,000,000-dollar crop of 1907? (*Corn*, page 20, Bournan and Crossley). It is not the steam plough that is responsible for the bulk of this output.

Par. 5. "I say only by use of the steam plough, etc."

Much too careless and sweeping an assertion. Mr. Acutt should ascertain a few of the results obtained by progressive farmers in Standerton District, to mention but one locality, before committing himself to such a pronounced statement.

Par. 6. Even weeds require moisture before they are capable of very rank growth, my own experience being that a rain sufficient to give a good growth of weeds is sufficient also to plough on.

Par. 7. Is Mr. Acutt really serious in saying, "And this can only be done by steam ploughing"? I refrain from further comment.

Par. 8. "Groups of farmers, etc. . . . the large export of mealies, etc. . . . will be the result of large farms and not small ones."

Exactly the reverse of the truth; the history of all countries goes to show that closer settlement increases production.

And the conclusion of the paragraph: "But I am looking, etc. . . . and here farmers certainly are dependent upon rain to enable them to plough their land."

Of course we are. Why not? And I might add that the steam plougher is equally dependent on the same rain to germinate his seed and successfully grow his mealie.

Your contributor appears to have been carried away by the extent of the broad acres and the magnificence of the scale of work at Vereeniging, but such opinions appearing in the Government agricultural publication of the Union need refutation. The idea that the land can only be economically and intelligently worked by the operations of huge concerns, more akin in staff and turnover to a small Rand gold mine than an average farm undertaking, is entirely opposed to modern ideas of land settlement as generally expressed in this country and as in operation in other colonies.

Let me now disavow any hostility to the steam plough; granted favourable conditions, suitable land in quality and quantity, proximity to rail line, cheap coal supply, and abundant capital, to mention a few essentials, it can justify itself or the reverse by the final test of a balance-sheet in the same way as any other method of farming. There is plenty of land yet for either individual, company, or co-operative venture, but I emphatically object to being told that only in steam ploughing (par. 5) can we hope for success (good results).

I venture to say that many individual returns per acre by methods of ox or horse traction have been just as satisfactory as the average at Vereeniging, and let me submit the opinion in direct opposition to the views expressed by Mr. Acutt in par. 8—that, broadly speaking, the large production of mealies we may look forward to in South Africa will be the result of, and depend on, the intelligent working of many comparatively small individual farmers, and not the result of the production of large estates of 10,000 acres and upwards.—Yours, etc.,

Vlakfontein, P.O. Balfour,
Transvaal, 25th July.

JAS. READ.

SMUT IN WHEAT, BARLEY, ETC.

To the EDITOR of the *Agricultural Journal*.

SIR,—I have from time to time and in various journals, etc., noticed correspondence on "How to prevent smut in wheat, barley, oats, etc." I have repeatedly tried bluestone, but without success. However, last year a friend gave me a very simple method, viz.: Heat water to anything above 180°, even to boiling point. Pour a quantity into a bath, tub, or any receptacle which will accommodate half a bag of grain, and reduce the temperature to 135° F. by adding cold water. Plunge your seed (bag and all) into the water (135°) and keep moving. Keep the water at about 133° for five minutes, after which allow the seed to remain in the water for five minutes more (ten minutes in all). It may be sown immediately or dried and stored. After the first plunge the temperature will fall to about 120°, but it must be brought up immediately to 133°. I tried the plan with great success last season.

Will any of your many readers who have perhaps tried this method give us the result of their experience, or perhaps some may be tempted to try it?

I may add that the same water may be used a dozen times, so long as the temperature is right.—Yours, etc.,

Dagga Boer Hoek,
P.O. Witmoss Station.

S. T. E. MEAKER.

THE SECRETARY BIRD.

To the EDITOR of the *Agricultural Journal*.

SIR,—In the July number of the *Agricultural Journal* Mr. Winsor, of Mosita, writes casting certain reflections on the integrity of the secretary bird, in which he accuses him of immoral practices, eating a hen and a small hare, etc., and not confining himself strictly to his proper avocations, i.e. catching snakes and other poisonous reptiles. Personally, I agree with Mr. Winsor. I look upon the secretary bird as a fraud; he is not what he is cracked up to be! For a hundred years he has been posing as a public benefactor and the friend of man, and got himself protected by law, while all the time he has been surreptitiously gobbling up our young partridges and other game birds. I have narrowly watched him for over sixty years, and have not only never seen him kill a poisonous snake, but never seen him even in possession of a dead one. I once saw what appeared to be a mortal combat between a secretary and some apparently terrible monster; it reminded me of St. George and the dragon. On riding nearer, the secretary seemed delighted for an excuse to fly away, and on reaching the spot I found a small harmless grass snake. Now, I am not sure whether the secretary was trying to catch the snake or vice versa; what I do think was that the secretary saw me passing and seized the opportunity of keeping up his reputation without any risk to himself. I do not wish maliciously to malign the character of so respectable and dignified looking a bird, and hope that some evidence may be brought forward in his defence, but I am afraid that if his good actions were weighed in the balance against his corrupt practices he would be found sadly wanting.—Yours, etc.,

Hiltondale, Rosmead. F. H. BARBER.

To the EDITOR of the *Agricultural Journal*.

SIR,—A great deal of controversy appears to exist on the question of the usefulness or otherwise of the secretary bird, but without any apparent result, though I have every reason to believe that the greater majority of sportsmen favour the destruction of the bird in question than its preservation, primarily for the reasons which I contributed to the "Game Notes" appearing in the *Transvaal Leader* during April, to the effect that of our natural enemies of winged game we can safely classify *inter alia* the secretary bird. I disagreed with previously expressed opinions as to the secretary bird doing more good than harm, since I repeatedly observed serious destruction wrought by them on young birds and even on young buck.

I have noticed secretary birds in districts where young partridge, pheasants, and guinea-fowl abound and where snakes are less numerous than in other parts which are practically devoid of game. I do not believe in the idea that these birds live principally on snakes and other small vermin, and have come to the conclusion, with little hesitation, that they have most inimical tendencies.

I agree with the remarks by "Austro-Africano" in your last issue; and I think that any protection afforded to these birds should be removed from the Game Laws in the Provinces where penalties are imposed. I understand that the matter is being dealt with by our local game association in this direction, which will no doubt meet with hearty approval.—Yours, etc.,

P.O. Box 212, Pretoria. J. A. PULLEN.

THE NECESSITY OF WATER CONSERVATION.

To the EDITOR of the *Agricultural Journal*.

SIR,—Having been associated with Queenstown for many years and intimately acquainted with the position and all the conditions connected with their new reservoir, of which they are justly proud, I was struck with the vivid and very graphic description of it which appeared in the *Cape Times* a few days ago. To me it conveyed a great deal, for the reason above specified. What lent it interest was the account of its picturesque surroundings of hill, mountain, vale, and valley with which it is encompassed, and which also forms its gathering grounds, typical of many another site possessing equal, if not greater, facilities. The whole of the drainage area in this instance only comprises forty square miles. I wish readers especially to note this, because this dam (which may be indefinitely extended) is represented to be the largest sheet of artificial water in South Africa, and yet, according to this article, this capacious dam of no less than 1,500,000,000 gallons of water, with its comparatively small drainage area, has been replenished to the point of overflowing.

If this has happened in a normal year of rain, preceded by a season of drought, the inference is that in an abnormal year when we are visited with floods it could be filled two or three times over, giving some thousands of millions of gallons as a reserve supply in times of great dearth.

Now this account, supported by facts and figures of what might be done to develop our agricultural industries and place the people on the land, is most opportune, coming as it has done on top of the splendid and patriotic act of the Senate in appointing a Committee of their House to investigate this important question of settlements, and a splendid case they have made of it.

Such examples as this of a people driven by circumstances and need to combine in preserving these gifts of nature affords a most valuable object-lesson. It also helps to solve the difficult problem that has so long been agitating the public mind as to our ability to store sufficient water in this country to make settlements a success, except it may be from such sources as the Orange, Vaal, Caledon, Fish, and some of the larger rivers.

This was the view of one or two extreme pessimists, who held that nothing good could come out of Nazareth, and who maintained that it was only possible to form effective irrigation schemes on the two big rivers, and that the only chance of establishing successful agricultural colonies was in well-watered countries. I am not going to review all the evidence, but these statements were controverted by that of Mr. Gordon, who said that even the far-famed Californian fruit region had no rivers, but all the water required for irrigation was carried by flumes from distant rivers or got from wells.

Then we have the evidence of Mr. Kanthack and Mr. Halse with regard to the possibilities of the Indwe scheme, where they have a site for a reservoir capable of containing 6,000,000,000 gallons, but which Mr. Halse, I suppose mistaking Queenstown figures for this, put at 1,300,000,000 gallons. This dam could be replenished by two rivers, the Indwe and Dorne Rivers, one draining an area of 75 square miles and the other 110 square miles. Both these rivers take their rise in the Great Drakensberg, while a third river taking its rise in another range of mountains, could be diverted if necessary.

I may here state that the land involved in this scheme abuts upon native territory which would be largely benefited by the conservation of the waste or flood water, as it could either be reconserved or carried by gravitation.

Not very far off I know of another magnificent site in the Native Territories where water could be conserved at relatively small cost in comparison with the benefits that it would confer. The argument that I hold is that if it is necessary to devise schemes for closer settlement of the whites where we already have nine-tenths of the land, is it not equally necessary that some such provision should be made for them in their more densely congested centres?

We may ignore the fact and we may legislate as we like about restricting natives to their own territories, but with their much more rapid increase, and as partners with ourselves in this sub-continent, we will be bound in the near future to consider the economic conditions of their country. This as much for the sake of their salvation as our own security. Besides this, are they not producers as well as consumers with growing wants as civilization advances? I would like to point out how all these native territories are deteriorating through erosion, all of which is helping to impoverish the country, for we must try and look at the country as a whole.

But time will not permit and I want to substantiate my facts with regard to our neglected opportunities.

Mr. Du Toit, Under-Secretary for Agriculture, when questioned upon our agricultural possibilities for future development, instanced several very desirable schemes that might be inaugurated with great advantage to the country, and one in particular where a huge tract of country in a desolate region could be brought under the beneficial influence of irrigation.

It was no doubt very rich land, as the Karoo generally is, containing all the inherent properties that would make it valuable, only awaiting the application of water to make it fruitful. This reminds me of Mr. Gordon's further evidence, in which he tells the Committee of a single scheme inaugurated by the New South Wales Government at a cost of £1,600,000,000 (one thousand six hundred millions). This was built in an arid region and had the effect of sending up the price of land from 20s. an acre to from £80 to £90 per acre. Edgar Allen Forbes, the author of "The White Helmet: The American Travellers in Northern Africa", gives an instance where land in Egypt was enhanced by 1000 per cent. after the completion of the great Assuan Dam, which shows that, no matter how costly such an undertaking may be to a nation, it sometimes proves to be the most profitable investment they can make. In this case we know how the creation of this great work saved the country from absolute ruin and has left them with a handsome surplus.

One is always afraid of taking up too much space, so that you can only glance at the evidence in this invaluable report, but the consensus of expert opinion is that if a consistent and economic conservation policy is adopted throughout the Union, we will not only in a short time be able to grow sufficient for our own consumption, but largely for export too.

Mr. Gustav Baumann, late Surveyor-General of the Free State, who, to judge him from his writings and from his intimate knowledge of the whole topography of the State,

must be an authority upon its agricultural capabilities, in his evidence told the Committee that there were large tracts that lent themselves extremely well for the purpose of extensive irrigation works. He further observed that if these were started the land could be made to support scores more people than at present, and the production would be increased accordingly. Asked to give an instance, he mentioned one case where between 100,000 to 120,000 acres can be brought under irrigation immediately below the dam, which he said he had not the least doubt could be replenished by the Riet River.

This brings me back to the Queenstown reservoir. As I wish to illustrate this, I must crave indulgence for a little more space. Because when these possibilities are mentioned and we draw comparisons between India, Egypt, Australia, or Canada and ourselves and what they would do under our circumstances with a £6,000,000 bill to foot for imported foodstuffs, our pessimists immediately say: " Oh! but the same conditions do not prevail that you find in these countries. We have no Himalaya Range, with its melting snows; no Nile, with its annual floods; no Goulburn, with its great volume of water from the interior, to replenish these mighty structures." True; we do not aim at these collossal undertakings, but is that not all the more reason why we should, by every means in our power, try to capture the blessings that Providence sends us, and thus, at least, remove the reproach of our incapacity to feed ourselves. That is not all, but by preserving our resources as far as possible it may to a very large extent enable us to avert the terrible death-roll among our stock that periodically sweeps the country when the dry cycles set in.—Yours, etc.,

Tantallon House, Rondebosch. E. R. BRADFIELD.

SORE TEATS.

To the EDITOR of the *Agricultural Journal.*

SIR,—With regard to the letters from Messrs. R. Thompson and J. J. van der Merwe referring to sore teats, I wish to give you the following remedy:—Take two parts of old cream, one part of brandy, and mix thoroughly. After milking, when the calf has finished sucking, rub the teats well with this mixture, and within a few days the teats will be all right again.—Yours, etc.,

Nieuwjaarspruit, Wepener, O.F.S. W. J. DU PLESSIS.

Questions and Answers.

These pages will be devoted to questions, and an endeavour made to reply to all inquiries upon agricultural topics of general interest, or concerning any of the articles published from time to time in the *Journal*. In all cases replies will be posted to correspondents so soon as same have been procured.

Correspondents are requested to write on one side of the paper only. No manuscript will be returned.

All letters must be addressed to the Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria.

CURDLING OF NEW MILK IN BOILING.

F. C. Motham, P.O. Box 2103, Johannesburg, asks:—Would you be kind enough to give me your opinion of the cause (and cure) of the curdling of new milk when boiling. The milk was from a cow about three months off next calving time, and was boiled about an hour after milked. The cow appears healthy and is fed on a mash of bran and little mealie meal, and manna, dry lucerne, green barley, and runs also on the veld.

Answer.—The Acting Superintendent of Dairying replied:—I am afraid that it would be impossible to give you either the cause or the cure of the milk from your cow curdling when boiled an hour after being milked, unless investigations were made on the spot and the milk subjected to a bacteriological examination. It is quite an unusual thing for milk to curdle when boiled so soon after milking, unless it happened to be milk from a newly calved cow or milk containing over a certain percentage of acidity. Assuming that your milk was sweet at the time of boiling, it points to something being wrong, quite out of the ordinary known causes. I would therefore advise you to send a small bottle of the milk addressed to Dr. Theiler, Government Bacteriologist, Onderstepoort, Pretoria, for examination. The food you are giving your cow is quite good, and if you want to vary same (which is a good thing) you could substitute the bran mash with crushed oats.

VROEGEBAARD WHEAT.

A correspondent asks where seed of Vroegebaard wheat can be obtained. If any readers can supply the desired information, together with quotations, it will be esteemed. [9264].

JAGTZIEKTE IN SHEEP.

A. J. Barlow, Frankfort, District Boshof, Orange Free State, writes:—As I am troubled and have been for some considerable time with a form of lung-sickness in my sheep and have tried various remedies but without avail, I am writing to see if you can help me. The disease appears mostly amongst young ewes, but occasionally amongst older ewes. They begin to fall off and gradually waste away until they die, just as with consumption in human beings. On opening after death the lungs are found to be hard, enlarged, white in colour, and grown on to the ribs; some also have diseased livers, and the bowels are yellow-coloured in places.

Mr. D. J. du Plessis, Nieuwjaarspruit, Wepener, Orange Free State, makes a similar inquiry.

Answer.—The Veterinary Division (Transvaal) replied:—There is strong evidence that in certain conditions jagtziekte is infectious or contagious, but all attempts to communicate it artificially by inoculation of the blood with inflammatory products from the lungs have failed. It is supposed that this disease has some connection with cold and wet, appearing especially during the winter months, but there is every reason to believe that, in addition to this, another condition is required, although so far this has not been traced. Jagtziekte is a pneumonia—that is, an inflammation of the lungs, but of a peculiar character. Treatment is not of much avail. As jagtziekte may be infectious, the affected animals should be isolated, but the most profitable way of dealing with it is to slaughter the animals as soon as the presence of the disease can be detected—while they are in good condition. The meat is perfectly wholesome, as the disease is confined to the lungs.

INCONTINENCE OF URINE IN COW.

J. W. Lotz, West Krugersdorp, writes:—I have a cow; she was in calf and then by accident she was served by another bull; since that time she has been languishing and her water is continually dropping. I have had twice some stuff from the chemist, but it has not done any good. Please let me have your advice.

Answer.—The Veterinary Division (Transvaal) replied:—It is just possible that the second bull, when making a connection with the cow, injured the neck of her bladder; at least, the fact that her water is continually dropping would point to this injury, one which it is difficult if not impossible to relieve. The cow should be kept quiet, and not syringed in any way. Possibly with time and patience she may come all right.

WINTER GRASSES.

In reply to a correspondent seeking advice regarding winter pasture grasses, the Government Botanist wrote as follows:—I recommend *Paspalum dilatatum* for the vleis and tall fescue (*Festuca arundinacea*) for the upper lands, provided the ground is not too sandy and dry. For the dry sandy soils, sheep's burnet (*Sanguisorba minor*) is the best with an admixture of lamb's tongue (*Plantago lanceolata*). The seeds of all of these may be obtained from local seedsmen. With regard to paspalum, it is true that it does not remain green during the coldest weather, but it is the last grass to turn brown in the winter and the first to become green in spring. It is of special value in swampy ground because it stands flooding and chokes out the coarser grasses. Tall fescue keeps green all the winter and continues to grow during our coldest weather provided it has a certain amount of moisture in the soil. I do not know what your friend refers to under the name of "Canada rooi grass"; it is probable that I know the grass, but not under this name. I am not aware that it has been tried here, and it would not be wise to go in for it till it has been tested. In any case, tall fescue, burnet, and paspalum meet possible requirements in your part of the country, and I should advise planting them in preference to other things. But you might try a little phalaris and perennial ryegrass to see how they answer.

CLEANING TEFF SEED.

W. D. McIntyre, Witfontein, P.O. Meyerton, writes:—Kindly inform me what number of mesh would be suitable for sifting teff seed from pigweed and other foreign seeds. I have seen the paragraph on page 602 of the *Journal*, but am anxious to avoid the expense of purchasing a patent machine. I am informed that the first prize teff seed at the last Johannesburg Show was cleaned entirely with a sieve, and I am confident that no patent winnower could do better.

Answer.—The Government Botanist replied:—I understand that the teff seed in question was not cleaned by sifting but by hand-winnowing on a quiet day. The freedom from mist-breede seed (*Amarantus paniculatus*) is due to the fact that the growers sent their boys through the field reserved for seed, some time before harvesting, and carefully hand-weeded for any stray mist-breede plants. When teff grass is sown thickly, i.e. at the rate of 7 to 10 lb. per acre and care is taken to sow evenly, there is usually little or no trouble with weeds. A good deal depends, however, on the treatment of the soil at the time of sowing. It is necessary to sow at the time of the last harrowing, or, to put it the other way, to harrow at the time of sowing. Some farmers have been known to leave their sowing until a week or ten days after the harrowing, with the result that the weed seeds have had a start of the teff seed, and it has then become impossible for the teff plants to smother the weeds; if both have had an equal start, and if sufficient teff seed is used, the latter makes an excellent smother crop, scarcely any weeds being able to beat it.

BEANS FOR THE FREE STATE.

M. E. Emmerson, P.O. Don Don, Orange Free State, asks for advice as to two of the best kinds of beans for the Orange Free State, and where seed is obtainable.

Answer.—The Acting Under-Secretary for Agriculture, Bloemfontein, replied:—Canadian Wonder and Early Runner are among the best varieties. A limited quantity of seed can be supplied by the Department of Agriculture, Bloemfontein.

POTATO QUERIES.

J. C. Summers, P.O. Box 52, Boksburg, writes:—I have at present seed potatoes planted in January (imported seed Early Rose) still in the ground; do you think it wise to dig them and replant them again at once, or do you think it better to leave them for a period, and, if so, for how long a period? Also, is it best to put them in a dark room or an open and well-ventilated shed? I have a large heap of wood and coal ashes—most coal ashes; do you think it would be good to mix with kraal manure for potatoes, and do you think coal-dust is good to mix with kraal manure for potatoes?

Answer.—The General Manager, Experiment Farm, Potchefstroom, replied:—Assuming that it is desired to plant the potato crop in August or September, I would advise raising the present crop for seed purposes about the end of this month, so that the "seed" can be stored and hardened for two or three weeks before planting. Do not store the seed in a dark room; spread it out thinly on a dry floor in a well-lighted shed. In regard to wood and coal ashes, there would be a certain amount of potash in both, but in each case the manurial value would be small unless the ash were very fine, i.e. completely burnt out. The coal-dust would be of no value.

POULTRY.—BEST LAYING BREEDS.

M. van der Merwe, Senekal, writes:—On page 604 of your last issue (English) the Poultry Expert says that Wyandottes, Orpingtons, and also Plymouth Rocks are the best laying breeds. Now I ask you whether this information is not contrary to the facts? On page 593 of the same *Journal* I see with regard to the third egg-laying competition in the Western Province the following results:—

Nos. 1 to 12, Leghorns; No. 13, Andalusians; Nos. 14 and 15, Leghorns; Nos. 16 to 18, Wyandottes; No. 19, Leghorns; Nos. 20 and 21, Wyandottes; Nos. 22 to 32, Leghorns; No. 33, Wyandottes, etc.

In No. 42 come the first Orpingtons, and no breeder has had the courage to enter Plymouth Rocks. We know that facts speak for themselves and also that experience is the best teacher, and therefore I cannot agree with the expert's answer.

Answer.—The Poultry Expert replied:—Correspondent does not appear to have read the whole of my answer on page 604 of the *Union Journal* for May, 1911, for I distinctly say that "these may not produce quite so many eggs as the Leghorn or Ancona, but they lay better during the cold weather". I naturally take it for granted that every farmer knows that eggs produced during the cold weather, say in May and June, are of far more value than those laid in the spring, i.e. September and October; in fact, one egg laid during May and June is worth nearly three laid in September and October, not only from the market point of view—for fresh eggs on the Potchefstroom market to-day are 2s. 9d. to 3s. 6d. per dozen, whereas in October they are worth 1s. to 1s. 3d. per dozen—but also because one pullet hatched during May, June, or July is worth three hatched during October, November, or December, for the early hatched birds are laying at the season when eggs are most valuable, whereas late hatched birds will not lay until towards the end of winter when eggs are falling in price; further, winter hatched chickens always grow out better and make larger birds than those hatched during the later months. I would further refer to the results of the laying records obtained on the Experiment Farm, Potchefstroom (see page 108 of the February number of the *Union Journal*), by which you will see that the White Wyandottes and the Buff Orpingtons take the first and second places, Silver Wyandottes are sixth, White Orpingtons eighth, and Plymouth Rocks ninth, the latter breed being handicapped owing to the death of one bird twenty-four days before the end of the period for which records were kept. Further, the question of climate is an important one. The climate at Rosebank is not, I should say, so severe as in many of the inland districts, and this would naturally be a point in favour of the non-sitting varieties. Again, the competition covered a period of twelve months, which gives the non-sitting varieties an opportunity to make up for the lost time while the heavy breeds are broody, and in my answer to which reference is made I do not say that the heavier breeds will always lay the most eggs—the question rather is as to *when* the eggs are laid. There is another very important point which has apparently not been noticed, but which I mention, i.e. "a great deal depends upon the strain; there are good and bad laying strains of all breeds", and this possibly accounts for certain breeds figuring at the top and also very near the bottom in some of the laying competitions, the winner naturally being of a good laying strain, whilst those in the rear-guard are of a poor laying strain. In the many laying competitions that have been held in the various parts of the world during the past few years the heavy breeds have, I think, proved themselves, for they generally figure either at the head of the list or very near to it. I quite agree that experience is the best teacher, but you are taking your basis from the laying competitions at Rosebank, which is only one of many which have been held in the various countries within the past few years, and only proves that poultry breeders in the Cape have good Leghorns, but that there is room for considerable improvement in their heavier breeds.

MEALY BUG IN GRENADILLAS.

T. A. Binks, P.O. Box 41, Randfontein, asks:—Will you kindly inform me what to do with a grenadilla vine which is blighted and under the leaves of which are groups of little insects, grey in colour and in a sort of whiteish down. The leaves turn yellow and die; and as I do not wish to have the whole vine die which is about 70 feet, I shall be obliged if you can suggest something either in a spray or otherwise.

Answer.—The Government Entomologist (Transvaal) replied:—These insects are the mealy bug (*Dactylopius spec.*). They have often been reported on grenadillas and other plants. These insects are covered with a fluffy exudation which often gives the infested plants an appearance of being covered with meal, hence the name "mealy bug". By reason of this fluffy exudation these insects are well protected, and it can therefore be understood that several thorough sprayings are necessary to make an impression on this pest. A solution of one part of tobacco extract in seventy-five parts of warm water put on the infested plants in a fine misty spray with a certain amount of force, has been found to give good results.

INCUBATION OF OSTRICH EGGS.

Edmund Dundas, Carlton, Addo, Cape Province, asks:—(1) In incubating ostrich eggs, what are the maximum rise and fall for safety—that is, above and below the normal temperature? (2) Is cooling of the eggs daily a necessity? (3) Can you advise any small book on incubation

Answer.—The Government Agriculturist (Cape) replied:—(1) In incubating ostrich eggs a *safe* maximum temperature may be taken at 105 degrees with a minimum at 93 degrees. This is allowing for a normal temperature from 98 to 102 degrees. The safe maximum and minimum temperatures referred to above may be continued for not longer than a few hours, but if the temperature is maintained for any longer period it will be attended with much danger. There have been instances where eggs have cooled to the same temperature as the outside air and remained so for twelve hours, and also where they have gone up as high as 108 degrees for the same period of time, and the chicks have come out alive, but such experiments are very dangerous, and would certainly be fatal if attempted during the first twenty-one days of incubation.

(2) The daily cooling of eggs is necessary, the usual practice being to cool for ten minutes both morning and evening at the beginning of incubation, turning the eggs on both occasions. The period of the cooling operations is increased from twenty to thirty minutes, twice daily later on. Attention must be given, however, to the state of the weather. The periods just mentioned are given effect to in normal weather, but it will be necessary to regulate the time according to the outside temperature.

(3) There is no literature on ostrich rearing generally that has been published in this country, but you will find useful information in regard to incubating in a book on the subject written by Hearson, obtainable, I understand, from Messrs. Clarke Bros. and Brown and doubtless other publishers in the country.

LIME-CLOGGED PIPES.

"Correspondent" writes:—I have 1500 feet of inch pipes, which are practically useless to me, as they are all clogged up with lime. The spring-water has such a great percentage of lime that these pipes had been rendered useless in a very few years' time. Could you or any of your readers be so kind as to inform me (*a*) how these pipes could be cleaned? (*b*) if not, for what purpose these pipes could be used? By so doing you will greatly oblige me.

Answer.—This correspondent omitted to forward his name, but as the question he asks affects many people in the dry sections of South Africa, the usual rule is abrogated and an answer published. There are ways of cleaning such pipes, but none, so far as we are aware, are of a practical nature in "Correspondent's" circumstances. A dilute solution of hydrochloric acid will slowly dissolve out accretions of lime, but the cost is against such a procedure in this case, so it would not be economical. Beside that, it is very doubtful whether this method would be really practicable in such a length of piping of so small a diameter as an inch. The only other course open would be to dismantle the piping and bore the lime out mechanically. It is, therefore, apparent that the easiest and cheapest method in the end is to use the pipes as long as possible and renew when necessary. The old pipes would not be worth much, but if well clogged they might be useful, cut in desired lengths, as fencing standards or supports for trellises, etc.—Ed. *A. J.*

TANK DIMENSIONS FOR IRRIGATION PURPOSES.

T. H. Matthews, District Willowmore, Cape Province, writes:—I intend to put up a wind pump for irrigation purposes, and shall have to build a tank to store the water. Will you please inform me what size tank I should require to hold sufficient water to irrigate one morgen of ground at a time?

Answer.—The Director of Irrigation replied:—The irrigation of one morgen of land requires 21,780 cubic feet of water; this is equivalent in amount to three inches of rain. Tanks of the following dimensions will contain the necessary quantity of water:—

Length.	*Width.*	*Depth.*
74 feet.	74 feet.	4 feet.
60 feet.	60 feet.	6 feet.
53 feet.	53 feet.	8 feet.

The capacities of the reservoirs can be reduced to one-half by halving any one dimension or to one-quarter by halving any two dimensions.

POULTRY QUERIES.

F. J. P. Walker, Bethlehem, writes:—I am, besides my other stock, a bit of a poultry fancier, and have gone in for the Silver Grey Dorking. I happened to be unfortunate with the pen I got (which was from Natal), the two hens taking roup and dying when I had only two dozen eggs. Since then I have lost an occasional bird, and I presume it must be roup; the last birds just pined away and died mere skeletons. I burned the carcasses myself to make quite sure of eradicating the disease, and now I see that one of my Dorking pullets has roup. I would also mention that I have the whole poultry run swept out once a week and disinfect the house once a month with strong Little's dip. Can you suggest what I should do to get the disease out of my yard? My Dorking hens which died had roup, but I do not understand what my four common hens died from, as I saw no signs of roup—they simply wasted away and it only struck me to-day when I saw another pullet ill and found it to be diphtheritic roup that probably the others that wasted away might have died of the same. How should I give lime to the fowls? Just get a bucket of slaked lime and mix with water and fine gravel and put into the yard? I would be very glad to hear the Poultry Expert's opinion on how to get rid of the roup.

Answer.—The Poultry Expert (Transvaal) replied:—I am afraid that you have made rather an unfortunate selection in buying Dorkings, for I have never heard of any one succeeding with this breed in either the Transvaal or Orange Free State in spite of the fact that many—myself included—have given them a trial. Why they should not thrive here is hard to say, but that is the opinion of all who have kept them. I do not think that death was due to roup, but from your description should say that the birds had what is known in poultry parlance as "going light", which may be due to either tuberculosis or consumption, but in either case I can give you no cure, for both diseases are incurable and will probably be inherited by the progeny. You can give lime to the birds by means of oyster shells, lime mortar from an old building, or you can thoroughly slake half a bucket of ordinary lime and place it in the run.

CURING LOOFAHS.

"S.", Kingwilliamstown, asks for a recipe for curing loofahs—i.e. preparing them for toilet purposes.

Answer.—The Government Botanist replied:—The "loofah" of commerce is prepared from the fruit of *Luffa aegyptiaca* and consists of the network of fibres existing in the interior of the fruit. The fruits should be allowed to remain on the vines until they have acquired a yellowish tint, but not until they have begun to assume a brown colour, as this indicates that the outer skin of the gourd is undergoing decay, which will cause the fibrous structure within to become discoloured. The fruits should be cut from the vine with about two inches of stem attached, for convenience in hanging. They should be hung in an airy, draughty shed for two or three days, and the outer skin will then be found to be fairly soft and pliant; this stage of the preparation is assisted by cutting off the tip of the gourd at the lower end, leaving a small hole through which the contained moisture may drip. The loofahs may next be removed by running the finger down the skin of the fruit on one side, splitting it open and turning out the loofah, which is at once thrown into a washing vat containing limewater (5 lb. of slaked lime to 50 gallons of water). The loofahs are stirred about in the limewater for a few minutes and are then removed to a draughty shed to dry. Care should be taken to shake the limewater out of each loofah before drying. If the loofahs are dried too quickly they are apt to become brittle and crack; they must not, however, remain damp too long, or they become mouldy, though the lime prevents this to a large extent and is, indeed, used in order to protect them from fungoid growths. When the loofahs are dry the seeds may be easily shaken out of them by hand, and when this has been done they are ready for the market.

CLEANING PIPES OF OIL ENGINE.

N. J. Oosthuizen, Drooge Kloof, P.O. Klaarstroom, Prince Albert, asks:—Will you be good enough to tell me what I must do to clean the pipes of my oil engine. The sediment of the brackwater attacks the pipe and jacket in such a manner that the water cannot properly circulate for cooling the piston. The water of the borehole contains a great quantity of sulphur.

Answer.—The Director of Irrigation replied:—The chief cause of such a large quantity of sediment settling in the water jacket and circulating pipes of oil engines is that most people allow the engine to become overheated, with the result that the water leaving the jacket is almost boiling, which causes a heavy deposit to be left in the jacket and circulating pipes. The water leaving the jacket should not exceed 120° Fah. When it is impossible to obtain a constant supply of water into the circulating tanks it is advisable to arrange two or more tanks suitably connected so as to have a large volume of water for cooling. To clean the sediment out of the water jacket and pipes it is necessary to disconnect the circulating pipes from engine, loosen joints and scrape out sediment with pieces of hoop-iron or wire. Most oil engine makers provide blank flanges on the side of cylinder casing for the purpose of cleaning out the jacket; these should be taken off occasionally and the deposit cleaned out.

COTTON.

J. S. Cameron, Bertrams, 34A Derby Road, writes:—(1) Is the Transvaal in and around Johannesburg suitable for growing of cotton? (2) If so, which is the best district? (3) Which is the best cotton to grow? (4) What is about the return per acre? (5) Does it require any special knowledge? (6) How long does it take to mature? (7) Has it to be planted yearly? (8) Does it require much water? (9) What is the best fertiliser to use, if any?

Answer.—The Chief of Tobacco and Cotton Division, replied:—(1) and (2) Rustenburg is the nearest locality to Johannesburg where cotton experiments have been conducted by this Division. These experiments have proved that the district in question is well suited to the crop, provided early varieties are cultivated and the seed sown with the early spring rains. (3) American upland varieties (Annuals) have given the best results even in the low veld where it is possible to cultivate the perennial varieties. Of course the high veld, including the Rustenburg District, would not be suitable for perennial on account of the winter climate being too severe. (4) As regards the return per acre, the average yield of lint per acre should be about 250 to 300 lb. or even more, and the product, at present market value should be worth about 7d. to 9d., and even 1s. per lb., provided of course proper methods are applied. At 5d. per lb. the crop should realize about £5 per acre. (5) No special knowledge is required to make cotton growing a success. In fact it may be said that the crop is one of the easiest to raise. (6) Seven to eight months from the time of sowing until the last picking is ready. (7) The cotton plant in its natural state is of course a perennial, but the bulk of the world's supply, which comes from the Southern States of the United States of America, is grown as an annual. Much may be said for both perennials and annuals, but we are inclined to favour annuals for the Transvaal. (8) An average rainfall of 30 inches or more should prove sufficient, provided no long period of drought is experienced. (9) As a general fertilizer formula, having no particular soil in view, I would recommend one carrying 3 per cent. nitrogen, 3 per cent. potash, and 9 per cent. soluble phosphoric acid.

S. H. Boyle, Maboki, Bushbrick Ridge, Pilgrims Rest, asks:—Can you tell me anything further about the Cotton Harvesting Machine? Our labour is bad—worse than last year—and costly.

Answer.—The Chief of the Tobacco and Cotton Division replied:—The cotton harvester will hardly be a paying proposition in this country for some time to come, unless enormous strides are made and the acreage under cultivation increased to a very great extent. There are indications, however, that such a satisfactory state of affairs may eventuate at no very distant date. The harvester is a 30-h.p. machine, and although the Department does not yet know the price of it, it is thought it will cost close on £1000. In the United States of America it is being worked by commercial houses, and a harvester is sent around to the cotton plantations of the Southern States, and after harvesting the crop on one plantation it passes on to the next plantation and so on. With the present output of cotton here it will be seen that the proposition just at the moment could hardly be considered a paying one. It is suggested that natives be paid so much per bag for cotton picking. If this can be done the advantages are obvious, for then it will be known exactly what it is going to cost to harvest the crop. A muid sack will hold about 50 to 60 lb. of seed-cotton, and it is suggested that 6d. per sack be paid, which would be about 2s. per 100 lb. The labour of native women and piccanins can well be utilized for this purpose and the cost is not high. In the United States of America, 50 cents per 100 lb. of seed-cotton is the usual price paid for picking.

Notes on the Weather.

CAPE PROVINCE (MAY, 1911).

By Charles M. Stewart, B.Sc., Secretary, Meteorological Commission.

Mean barometric pressure slightly higher than the normal; days cooler, but nights milder than the average; skies cloudier than usual, with a low fog-frequency; an abundant rainfall, about one-third in excess of the average; thunderstorms, mostly local, and but little hail; light falls of snow and sleet at a few of the higher stations; winds light and much more variable than usual, but with an excess of southerly breezes over the South-west and westerly over the greater portion of the rest of the country; an unusually small number of strong winds; some hot winds about the middle of the month, and frosts confined almost wholly to the last few days. These were the leading features of the weather of May, 1911.

Division.	Mean Rainfall (1911).	Mean No. of Days.	Average Rainfall (1891–1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	4·84	8	4·80	9	+ 0·04	+ 1
South-west	3·62	6	2·90	7	+ 0·72	+ 25
West Coast	1·46	4	1·51	5	+ 0·05	— 3
South Coast	3·70	8	2·36	6	+ 1·34	+ 57
Southern Karoo ...	3·56	7	0·99	4	+ 2·57	+ 260
West Central Karoo	1·59	7	0·85	3	+ 0·74	+ 87
East Central Karoo	0·90	6	0·79	3	+ 0·11	+ 14
Northern Karoo ...	1·23	5	0·85	3	+ 0·38	+ 44
Northern Border ...	1·39	4	0·62	3	+ 0·77	+ 124
South-east	3·13	9	1·35	5	+ 1·78	+ 132
North-east	1·35	7	1·02	4	+ 0·33	+ 32
Kaffraria	2·15	9	1·10	4	+ 1·05	+ 95
Basutoland	2·28	8	1·38	4	+ 0·90	+ 65
Orange Free State ...	1·97	6	1·04	3	+ 0·93	+ 89
Durban (Natal) ...			1·79			
Bechuanaland ...	1·88	7	0·50	1	+ 1·38	+ 276
Rhodesia	1·62	7	0·45	1	+ 1·17	+ 260

Precipitation during May was fairly uniformly distributed over the whole country and considerably in excess of the average over practically all the divisions, the mean, as shown by returns from 318 stations, being 2·51 in. on seven days, being 0·70 in., or 39 per cent., in excess of the usual depth. (If the returns for 134 stations in the Orange Free State be included, the mean is reduced to 2·35 in. on seven days.) The accompanying table shows that the mean sectional rainfall was practically normal over the West Coast and the Cape Peninsula, but considerably in excess of the average elsewhere, the Northern Border, Bechuanaland, and Rhodesia being favoured with unusually abundant late rains. The actual means varied from 0·90 in. over the East Central Karoo to 4·84 in. over the Cape Peninsula. The departures from the normals ranged from minus 3 per cent. over the West Coast to plus 276 per cent. over Bechuanaland, and plus 260 per cent. over the Southern Karoo and Rhodesia. The Northern Border and the South-east Divisions also had considerably more than double the usual amounts. The general distribution of these late rains is well brought out on summarizing the monthly totals of the 452 stations, from which it is seen that no station reported "absolute drought" during the month, and only 12 had 0·01–0·50 in.; 58 had 0·51–1·00 in.; 172 had 1·01–2 in.; 110 had 2·01–3 in.; 43 had 3·01–4 in.; 27 had 4·01–5 in.; 7 had 5·01–6 in.; 10 had 6·01–7 in.; 7 had 7·01–8 in.; 5 had 8·01–9 in.; whilst the maximum amount of 10·62 in. was recorded at Grootvader's Bosch, in the South Coast Division. Those exceeding 8 in. were Elgin (Plantation), 8·49 in.; Swellendam, 8·58 in.; Stellenbosch, 8·79 in.; Evelyn Valley, 8·97 in. Out of 315 stations furnishing particulars of the daily intensity, 85 had 0·01–0·50 in. as the maximum amount in 24 hours; 113 had 0·51–1·00 in.; 72 had 1·01–2 in.; 19 had 2·01–3 in.; 14 had 3·01–4 in.; 7 had 4·01–5 in.; 4 had 5·01–6 in.; and Stellenbosch had 7·00 in. between 12.15 p.m. on the 19th and the morning of the 20th. The next largest amounts were 5·88 in. at Elgin (Plantation); 5·20 in. at the Lower Reservoir (Capetown); 5·05 in. at Caledon; and 5·03 in. at Dwarsriviers Hoek, in the Stellenbosch Division, all on the 19th. As a result of these late rains over the country the veld is unusually green and in excellent condition, ploughing was being carried

on, and there seemed to be every prospect of a good winter. Crops already in the ground were looking well, and the yield of mealies at Sunnyside (Hay) was reported to have been very good so far. The only discordant note proceeds from Herschel, where the mealies and kaffir-corn being gathered in were reported as bad. At Armadillo Creek (Vryburg) the soil is stated to be soaked for over a foot down, so that larvae and pupae of various pests hatching out may be killed off by succeeding frosts. *Thunderstorms*, although more numerous than during the corresponding month of last year, were considerably less in number than during the previous month, 125 being noted on 25 days of the month. These storms were mostly local in character, except on the 26th, when a fairly large area was affected, and the 10th, when a much more limited number of stations was affected. *Hail* fell at 8 stations on 20th, 21st, 26th, and 27th. Slight showers of *snow* fell at Lauriston (Barkly East) on 26th, and at Tent Kop (Maclear) on 27th, 28th, and 31st, the ground being white on the 28th. *Sleet* was noted at 10 stations on 7 days.

Temperature, Cloud, and Wind.—The mean temperature of all stations was 57°·4, or 4°·8 cooler than the previous month, and 0°·9 below the mean for May, 1910. The mean maximum (67°·5) was 5°·5 lower than in April, and 2°·6 below that for May of the preceding year; but the mean minimum (47°·3), whilst 4°·0 lower than the corresponding value for the preceding month, was 0°·6 higher than during May of last year. Compared with the averages, the mean temperature of the month was 0°·8 below the average, the day temperatures being 2°·1 lower and the night temperatures 0°·4 higher than usual. The mean daily range was reduced to 20°·2. With a few exceptions, the monthly temperatures at the individual stations were above the average in the West, South-west, and South by 1–2°, but below the normals in the East and in the interior 1–4°, the deficits being least (about 1°) over the High Veld, and increasing to 2–3° over the South-east and Kaffraria. The largest excess was 2°·4 at Capetown and Cape St. Francis, and the greatest deficit was 4°·3 at Hopefountain (Rhodesia), and Teyateyaneng (Basutoland). These differences in mean monthly temperature are mainly due to the day temperatures, which were higher than usual by approximately 1°·5 to 3°·5 over the West, South-west, and South, and below the averages elsewhere commonly by 3–6°, but varying between 2°·2 at Kimberley and Dunbrody to 8°·8 at Teyateyaneng (Basutoland), the deficits over the eastern half of the country being mostly between 4–6°. In the case of the night temperatures the differences were much smaller, being commonly in excess of the average by about 1° at stations on or near the coast in the West and South-west, and about 2° along the South Coast, but below the normal by amounts ranging from one or two tenths to slightly more than 2° over the eastern and central portions of the country. Excess of night temperature was common to more than two-thirds of the stations, the greatest surplus amount being plus 2°·6 at Cape St. Francis, and the largest deficit, minus 2°·6, at Hanover. The mean warmest station was Cape St. Francis, with 63°·2, and the mean coldest, Hanover, with 46°·6, a difference of 16°·6. The highest mean maximum (74°·2) belongs to Dunbrody, and the lowest mean maximum (32°·5) to Hanover. The highest temperatures during this month were recorded during two warm spells from 1st to 5th, and from 13th to 19th, also on 25th; the first affecting stations principally in the East and Centre, and the second places in the West, South, and parts of the South-east. Except in Namaqualand, where the extreme minima for the month were registered on 1st to 3rd, the coldest spell was from 26th to 31st, more particularly the mornings of the 28th and 29th. The mean value of the highest day readings was 81°·7, or 3°·0 lower than during May, 1910, and of the lowest night readings 38°·0, or 0°·3 lower than during the corresponding period of the previous year. The mean monthly range was, therefore, 43°·7. The highest temperature recorded during the month was 92°·5 at Capetown on the 14th, and the lowest (25°·0) at Aliwal North on the 30th, showing an extreme monthly range over all stations of 67°·5. *Frosts* were confined to a few stations on 2nd, 3rd, and 7th, and from 11th to 16th, but were of wider occurrence from 22nd to 31st, more particularly on the 29th and 30th. These low ground temperatures were more numerous than last month, and slightly in excess of those during May of last year, being noted at 69 stations on the 19 days already mentioned. At Retreat, in the Cape Peninsula, the mean minimum temperature on grass was 42°·1, or 6°·2 lower than the shade minimum. Although the mean was only 0°·1 lower than in May of last year, the temperature fell below freezing-point (32° F.) on three occasions, being 30°·1 on 7th, 28°·1 on 12th, and 28°·3 on 28th, whereas it touched freezing-point on only one morning of the previous May. The highest reading of this thermometer was 57°·7 on 20th.

The mean percentage of *cloud* was 44, the same as in April, but 7 per cent. more than in May of last year. It was fairly uniformly distributed over the various sections of the country, being commonly from 40 to 55 per cent., but varying from 25 per cent. at O'okiep to 66 per cent. at Port St. Johns. *Fogs and mists* were noted at a few stations from 1st to 13th, 16th to 23rd, and from 25th to 31st, but were most numerous on 2nd, 11th, 21st, and 30th. *Winds* during this month were much more variable than usual, being distributed over all points of the compass at most stations, but showing on the whole an excess of southerly winds over the Cape Peninsula, easterly in Namaqualand, westerly along South Coast, north-westerly in the eastern portions of the country as well as at Durban (Natal),

and east to north-east over the more northerly parts of the interior, and south-east at Hopefountain. These winds were unusually light, the mean *force* being only 1·56, corresponding to a velocity of 6·7 miles per hour, or 0·3 miles per hour less than last month, and 0·4 miles per hour less than during May, 1910. They were strongest in the South-west and South, and lightest in the Central parts. At the Royal Observatory there was a decreased frequency of all winds between N. and NE., and between NW. and SSW., but a slight excess of southerly, south-easterly, and north-north-westerly breezes, and a large increase in the number of calms, which was also characteristic of the other stations. The mean velocity there was 5·2 miles per hour, or 0·8 miles per hour less than usual. *Strong winds and gales* were much less frequent than usual, being reported as occurring at only 9 stations on 7 days from 17th to 22nd and on 30th. Thirteen instances of *hot winds* were reported on 7 days, principally about the middle of the month, occurring on six successive days at Uitenhage. No *duststorms* noted.

The mean pressure at the Royal Observatory was 30·12 in., or 0·02 in. higher than usual, ranging from 30·35 in. on the morning of the 31st to 29·88 in. on the morning of the 18th.

TEMPERATURE.

Station.	Mean Max.	Mean Min.	Mean	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory	69·8	51·6	60·7	89·8	14th	41·5	28th
Capetown (South African Coll.)	72·0	51·8	61·9	92·5	14th	43·0	28th
Capetown (Hospital)	69·9	52·6	61·2	90·2	14th	46·1	28th
Bishopscourt	69·5	47·3	58·4	87·0	14th	39·5	27th
Groot Constantia	69·0	52·5	60·8	87·0	14th	46·0	26th
Retreat	72·2	48·3	60·2	90·5	15th	34·7	28th
Wynberg	71·5	50·9	61·2	89·0	15th	42·0	28th
Blaauwberg	67·9	53·1	60·5	89·2	15th	46·0	27th
Danger Point	66·5	53·9	60·2	81·0	18th	45·0	27th
Elsenburg (African College)	71·3	51·7	61·5	88·8	14th	42·8	27th
O'okiep	69·0	50·1	59·6	78·5	3rd	42·0	1st
Port Nolloth	67·4	49·0	58·2	92·0	13th & 16th	40·0	2nd & 3rd
Uitenhage	72·3	47·8	60·0	82·3	14th	35·0	29th
George (Plantation)	68·2	52·4	60·3	84·5	14th	44·0	28th
Cape Agulhas	66·6	55·2	60·9	89·0	16th	47·0	27th
Port Elizabeth	71·3	53·5	62·4	86·0	15th	46·0	29th
Dunbrody	74·2	46·7	60·4	84·3	17th	35·7	30th
Mossel Bay	70.0	52·3	61·2	87·0	16th	44·0	28th
Heidelberg	72·0	46·7	59·4	89·0	19th	37·0	28th
Cape St. Francis	69·9	56·6	63·2	86·0	18th	44·0	29th
Storms River	69·4	51·2	60·3	85·7	14th	43·6	29th
Amalienstein	69·7	44·8	57·2	83·0	14th	35·0	29th & 30th
Hanover	60·7	32·5	46·6	69·0	4th	26·0	22nd & 30th
Murraysburg	61·1	37·8	49·4	69·0	2nd	29·0	27th, 28th & 31st
Kimberley	66·4	42·4	54·4	80·0	4th	32·1	30th
Sydney's Hope	67·2	51·0	59·1	77·0	15th	45·0	6th, 27th & 31st
Cathcart	61·0	44·1	52·6	70·2	3rd	33·8	29th
Kingwilliamstown	70·0	47·1	58·6	80·0	18th	38·0	28th & 19th
Lovedale	67·1	47·0	57·0	77·0	18th	36·0	29th
Evelyn Valley	58·6	45·9	52·2	75·0	1st	38·0	30th
Aliwal North	64·1	37·7	50·9	76·5	4th	25·0	30th
Queenstown	64·8	40·1	52·4	74·0	4th	30·0	29th
Kokstad	62·3	37·6	50·0	72·0	25th	25·1	29th
Umtata	68·9	47·0	58·0	80·0	3rd	40·0	26th
Main	65·1	45·4	55·2	75·2	3rd	35·2	29th
Tabankulu	65·1	43·1	54·1	73·8	25th	34·5	29th
Teyateyaneng	58·7	37·4	48·0	71·0	4th	29·0	29th & 30th
Mochudi	71·0	45·0	58·0	88·0	3rd & 4th	32·0	31st
Hopefountain	68·9	48·5	58·7	78·3	5th	39·5	30th
Bloemfontein	59·6	40·8	50·2	71·3	4th	31·5	30th
Means	67·5	47·3	57·4	81·7	—	38·0	—
Extremes	—	—	—	92·5	14th	25·0	30th

Observers' Notes.

Vruchtbaar (*Wellington*).—First part of the month exceptionally dry weather and no ploughing could be done. The rains of the 18th to 20th were fine soaking rain, and the soil in best of condition for all work. All crops very promising.

Kruis River (*Uitenhage*).—Have had some very warm days this month, succeeding heavy dews. Less rain has fallen here this year from 1st January to 31st of this month by nearly 3 in. than we had for the corresponding period of last year. A good deal of ploughing still remains to be done, ground yet requiring more rain. Present crop of barley, barley-wheat, etc., look well. Stock well. Have had one sharp frost on the 29th.

Uitenhage Park.—A variable month. Seven hot winds—six in succession. Frost first observed on 29th. Rainfall slightly over average of nine years, but a decrease of 2·06 in. on corresponding month of 1910.

Ryedale (*Aberdeen*).—Veld in grand order. Lambs splendid, and prospects very good for the kidding.

Theefontein (*Hanover*).—Dense fog on 1st and 10th. Light frosts in early part of month and sharp towards end. Heavy mist on 22nd, with cold north-west wind. Veld fine and all stock in first-class condition. Every prospect of a good lambing season. Rainfall light, but considerably more than for corresponding month of last year.

Waverley (*Queenstown*).—No wind this month.

Sunnyside (*Hay*).—The fine rain of the 18th has done a lot of good to the bushveld, and so all stock are in splendid condition; there seems every prospect of a favourable winter. Mealie harvesting in full swing, and so far the yields have been very good.

Clifton (*Sterkstroom*).—Splendid rains; excellent for ploughing. Veld practically green.

Herschel.—No crops except mealies and kaffir-corn, which are bad and are being gathered in.

Sunnymeade (*Albert*).—Still very wet after the soaking rains in previous months. Stock improving, although winter has set in with very sharp frost.

Armadillo Creek (*Vryburg*).—Frost on 30th April did damage to late mealies, etc. Such a wet May is very unusual. The soil is soaked for over a foot down, and pupae and larvae of most pests—caught napping—will probably germinate and be followed by premature death.

Nottingham (*Mafeking*).—The rains have been unusually late this year. The weather has been warm and mild. First heavy frost on night of 28th.

Kokstad (*Coyte*).—Less rain fell than is usual in May. The monthly mean temperatures were considerably below this month's average, but no frosts occurred until late in the month, and grass is unusually green in consequence.

TRANSVAAL.

Observers' Weather Reports for June.

Barberton District—

Sheba Queen Mine.—Weather generally cold and dry, very little dew being observed. (W. Stenhouse.)

Cairn.—On the morning of the 28th there was a severe frost. Native trees were slightly burnt, and mangoes, guava, and citrus trees were tipped by frost. (T. S. Watkinson.)

White River.—Slight frosts on 28th and 29th, cutting down tomato plants and potatoes. (E. Owen.)

Bethal District—

Leeuwkuilen.—The weather has been very variable, the winds being choppy, westerly and south-westerly winds having prevailed. On the 2nd and 3rd of the month we had a bitter cold drizzle, the stock suffering a lot. For five days at the latter end of the month we had bitter cold windy days. The ground thermometer registered 18·5 degrees of frost on the 28th morning. (W. J. Wayland.)

Bloemhof District—

Katrina.—A nice rainfall for this time of year. Cold nights with sunny days; exceptionally cold from the 24th to end of month. (P. Lombard.)

Carolina District—

Waterval Boven.—The beginning of the month was nice and warm. Only the last few days were extremely cold. (H. C. Borcherds.)

ERMELO DISTRICT—

Ermelo.—The weather has been exceptionally cold, with heavy frosts during the latter part of the month. Winds chiefly light, and from west or east. (A. Drummond.)

De Hoop.—We have experienced an exceptionally cold month and hard frosts have been the rule, whereas usually frosts here are not very frequent. Potatoes have been cut down where previously they have always done well. (Capt. C. W. Alston.)

LYDENBURG DISTRICT—

Graskop.—Frosts were prevalent during the month, whilst strong winds were experienced at times. (G. Irvine.)

Belfast.—Severe frosts during the month. The hardest frost was on the morning of the 29th, when 26 degrees were registered on the ground. The month has been cool; highest maximum reading was 64·2 degrees in the screen. (G. J. Imrie.)

MARICO DISTRICT—

Enzelsberg.—The cold south-east winds during the last week in this month did some damage to the crops and also pulled down the cattle. On the morning of the 29th the minimum thermometer registered 23 degrees, a record for Enzelsberg. (J. C. Swart.)

MIDDELBURG DISTRICT—

Middelburg.—The weather during the past month of June has been in every respect in conformity with that usually experienced here following seasons of low rainfall—that is, clear, bright days with cold nights and little wind. The degrees of frost, amounting to as much as 12 in the thermometer screen and probably 16 or 18 on the ground, are usually excessive after little rain. The mean temperature for the month has been unusually low. (Dr. H. A. Spencer.)

PRETORIA DISTRICT—

Wagendrift.—Frost has done much damage on 23rd and 24th. (F. Garforth.)

STANDERTON DISTRICT—

Beginsel.—Latter part of month very cold. (A. Wilson.)

WAKKERSTROOM DISTRICT—

Wakkerstroom.—Very severe frosts during this month. (W. Pritchard.)

WITWATERSRAND DISTRICT—

Florida.—Heavy frosts during the month. (A. Lockie.)

ZOUTPANSBERG DISTRICT—

Pietersburg.—Heavy fall of frost nightly; bitterly cold mornings, merging into warm brilliant days. (W. Frankleyne.)

Machutiesberg.—Frost has been prevalent during the latter end of this month, slight damage being done to potato crops in places, but not severe enough to damage bananas and other vegetation. Owing to the late rains in May, grass burning in the low country has been prevented; thus we derive no warm atmosphere from them as usual. (J. McCallum.)

Louis Trichardt.—The wettest May on record at this station has been followed by the coldest June, the mean minimum temperature being 40·1 or 4·8 degrees lower than the average for the preceding five years. Ground frosts were observed on the mornings of the 12th, 24th, 27th, 28th, 29th, and 30th, whilst the minimum thermometer in the screen showed five degrees of frost during the night of the 27th. Winter crops of beans and other vegetables have been destroyed, but peach trees already in bloom have not been affected. (Sergeant J. C. N. Clark.)

Rainfall for June, 1911.

CAPE PROVINCE.

I. Cape Peninsula:

	Inches.
Royal Observatory (a) 12-inch gauge	4·55
Capetown (South African College)	5·15
Do. (Molteno Reservoir)	4·94
Do. (Platteklip)	6·67
Do. (Signal Hill)	2·30
Do. (Hospital)	2·95
Sea Point (The Hall)	2·48
Camps Bay	3·36
Table Mountain (Disa Head)	5·67
Do. (Kasteel Poort)	9·28
Do. (Waai Kopje)	10·33
Do. (St. Michael's)	11·12
Bishopscourt	5·56
Kenilworth	6·34
Wynberg (St. Mary's)	4·67
Groot Constantia	6·09
Tokai Plantation	3·51
Muizenburg (St. Res.)	3·31
Cape Point	1·20
Blaauwberg Strand	1·68
Robben Island	1·68
Maitland Cemetery	4·06
Tamboers Kloof	4·30
Woodhead Tunnel	7·27
Lower Reservoir	5·11
MacLear Beacon	10·84
Waai Vlei	11·13
Woodhead Dam	8·99
Retreat	3·34

II. South-West:

	Inches.
Klapmuts	3·65
Stellenbosch (Gaol)	3·57
Somerset West	2·93
Paarl	4·21
Wellington (Gaol)	3·10
Groot Drakenstein (Weltevreden)	4·80
Porterville Road	2·66
Tulbagh	2·48
Kluitjes Kraal	3·46
Ceres	5·97
The Oaks	1·75
Rawsonville	1·40
Caledon	2·41
Worcester (Gaol)	0·58
Hex River	0·74
Karnmelks River	2·82
Lady Grey (Division Robertson)	0·79
Robertson (Gaol)	0·60
Do. (Govt. Plantation)	0·73

II. South-West (*continued*):

	Inches.
Montagu	1·21
Danger Point	2·09
Elsenberg Agricultural College	3·44
Roskeen	2·60
Vruchtbaar	3·68
Ceres (Heatlie)	5·68
Waverley (Tulbagh)	2·17
Dwaars Riviers Hoek	6·96
De Doorns	0·75

III. West Coast:

	Inches.
Anenous	0·79
Klipfontein	2·26
Kraaifontein	0·90
Concordia	1·55
Garies	0·53
Van Rhyn's Dorp	0·48
Dassen Island	0·71
Kersefontein	0·90
The Towers	1·40
Malmesbury	1·70
Piquetberg	2·05
Wupperthal	0·58
Hopefield	1·10
Algeria (Clanwilliam)	2·54
Cedarberg (Clanwilliam)	2·96

IV. South Coast:

	Inches.
Cape Agulhas	1·86
Swellendam	2·37
Grootvaders Bosch	3·36
Heidelberg	2·04
Riversdale	2·25
Vogel Vlei	1·63
Mossel Bay	1·32
Great Brak River	1·69
George (Plantation)	2·16
Millwood	3·56
Plettenberg Bay	2·81
Harkerville	4·20
Blaauwkranz	3·14
Storms River	3·60
Witte Els Bosch	5·00
Cape St. Francis	4·40
Van Staaden's (Intake)	4·57
Kruis River	1·87
Uitenhage (Gaol)	1·82
Do. (Park)	1·52
Do. (Inggs)	1·79

IV. SOUTH COAST (continued):

Station	Inches.
Armadale (Blue Cliff)	1·53
Dunbrody	1·49
Port Elizabeth (Harbour)	2·02
Do. (The Slip)	1·57
Do. (Walmer Heights)	1·58
Shark's River (Nursery)	1·57
Centlivres	1·41
Edinburgh	4·03
Gamtoos Station	2·25
Zoetendals Vallei	2·20

V. SOUTHERN KAROO:

Station	Inches.
Triangle	0·66*
Pietermeintjes	1·50
Ladismith	1·34
Calitzdorp	0·45
Oudtshoorn	0·85
Vlaakte Plaats	1·65
Uniondale	2·26

VI. WEST CENTRAL KAROO:

Station	Inches.
Beaufort West (Gaol)	0·56
Dunedin	0·44
Nels Poort	0·47
Camfers Kraal	0·34
Krom River	0·11
Roosplaats	0·15
Lemoenfontein	0·54
Willowmore	0·39
Rietfontein	0·38
Steytlerville	0·11

VII. EAST CENTRAL KAROO:

Station	Inches.
Aberdeen (Gaol)	0·19
Aberdeen Road	0·00
Klipplaat	0·27
Winterhoek	0·86
Kendrew (Holmes)	0·42
Graaff-Reinet (Gaol)	0·67
Do. (Eng. Yard)	0·59
New Bethesda	0·50
Glen Harry	0·59
Wellwood	0·40
Bloemhof	0·39
Jansenville	0·33
Roode Hoogte	1·06
Klipfontein	0·40
Somerset East (Gaol)	C·70
Spitzkop (Graaff-Reinet)	0·97
Villeria (Aberdeen)	0·39
Grobbelaars Kraal	0·57

VIII. NORTHERN KAROO:

Station	Inches.
Sutherland	0·97
Fraserburg	0·42

VIII. NORTHERN KAROO (continued):

Station	Inches.
Carnarvon	0·23
Brakfontein	0·32
Victoria West	0·30
Wildebeestkooy	0·53
Murraysburg	0·89
Hanover	0·14
Theefontein	0·39
Philipstown	0·15
Petrusville	0·00
Colesberg	0·15
Culmstock	0·16
Cradock (Gaol)	0·15
Maraisburg	0·25
Steynsburg (Gaol)	0·50
Tarkastad	0·76
Drummond Park	0·65
Schuilhoek	0·27
Vosburg	0·45
Zwavelfontein	0·39
Zoetvlei (Richmond)	1·54
Klipkraal (Richmond)	1·00
Hotweg Kloof (Cradock)	0·42
Thebus Waters	0·44
Ruightersfontein	0·34

IX. NORTHERN BORDER:

Station	Inches.
Kenhardt	1·15
Upington	0·80
Trooilapspan	1·25
Van Wyks Vlei	0·53
Prieska	1·21
New Year's Kraal	1·25
Dunmurry	1·28
Karree Kloof	1·10
Douglas	0·84
Douglas (Vos)	0·81
Hopetown	0·49
Newlands (Barkly West)	0·82
Barkly West	0·86
Kimberley (Gaol)	1·00
Strydenburg	0·45
Stoffkraal (Prieska)	1·95
Sunnyside (Hay)	1·01
Rocklands	0·80
Peters Park (Gordonia)	1·61
Sydney-on-Vaal	0·93
Warrenton	0·85

X. SOUTH-EAST:

Station	Inches.
Melrose (Division Bedford)	0·38
Dagga Boer	0·34
Alicedale	1·35
Bedford (Gaol)	1·12
Do. (Hall)	1·04
Sydney's Hope	2·22
Cullendale	0·80
Adelaide	0·62

X. SOUTH-EAST (*continued*):	Inches.
Atherstone	1·78
Alexandria	2·77
Fort Fordyce	1·20
Grahamstown (Gaol)	2·32
Heatherton Towers	1·05
Sunnyside	1·95
Fort Beaufort	0·34
Katberg	0·49
Seymour	1·20
Glencairn	1·11
Port Alfred	3·90
Hogsback	1·87
Peddie	1·84
Keiskamma Hoek	0·96
Cathcart (Forman)	0·28
Cathcart	0·76
Thaba N'doda	1·60
Evelyn Valley	2·44
Crawley	0·00
Pirie Forest	1·17
Forestbourne	1·67
Isidenge	2·16
Kologha	0·58
Kingwilliamstown (Gaol)	0·35
Do. (Pym)	0·67
Fort Cunynghame	0·42
Kubusie	1·58
Quacu	0·26
Blancy	0·15
Bolo	0·25
Komgha (Gaol)	0·52
Chiselhurst	0·53
East London East	0·63
Cata	0·82
Wolf Ridge	1·14
Dontsah	0·66
Mount Coke	1·10
Albert Vale (near Bedford)	0·58
Huxley Farm	0·23
Amabele Junction	0·32
Insileni	0·34
Eastover	1·23

XI. NORTH-EAST:	
Venterstad	0·29
Mooifontein	0·26
Burghersdorp (Gaol)	0·58
Lyndene	0·63
Thibet Park	0·66

XI. NORTH-EAST (*continued*):	Inches
Sterkstroom (Station)	0·15
Rocklands	0·33
Aliwal North (Gaol)	0·34
Poplar Grove	0·10
Jamestown	0·40
Queenstown (Beswick)	0·39
Herschel	0·55
Lauriston	0·45
Lady Frere	0·20
Contest (Near Bolotwa)	0·17
Keilands	0·11
Barkly East	0·30
Hughenden	0·22
Indwe	0·15
Clifton	0·29
Edendale	0·10
Avoca (Barkly East)	0·98

XII. KAFFRARIA:	
Ida (Xalanga)	0·61
Slaate (Xalanga)	0·42
Cofimvaba	0·45
Tsomo	0·32
N'qamakwe	0·48
Main	0·24
Engcobo	0·28
Butterworth	0·18
Woodcliff	0·32
Kentani	0·14
Maclear	0·28
Do. (Station)	0·36
Bazeya	0·91
Willowvale	0·00
Somerville (Tsolo)	0·24
Elliotdale	0·47
Umtata	0·47
Cwebe	0·11
Tabankulu	0·50
Kokstad	0·15
Do. (The Willows)	0·27
Flagstaff	0·45
Insikeni	0·30
Port St. Johns	0·41
Umzimkulu	0·12
Umzimkulu (Strachan)	0·13
Lusikisiki	0·28
Tentkop (Elands Height)	0.09
Kilrush	0·10

NATAL.

Winkel Spruit	0·12
Mount Edgecombe	0·16
Cornubia	0·32
Saccharine	0·13
Milkwood Kraal	0·21
Blackburn	0·55
Cedara (Hill)	0·25
Do. (Vlei)	0·17
Giant's Castle	Nil
Weenen	Nil

TRANSVAAL.

	Inches.		Inches.
Barberton	Nil	Klerksdorp	0·21
Komatipoort	Nil	Pretoria (Arcadia)	Nil
Bethal	0·06	Modderfontein	0·06
Christiana	0·65	Rustenburg	Nil
Carolina	Nil	Standerton	Nil
Ermelo	Nil	Mbabane	Nil
De Hoop	0·01	Volksrust	Nil
Vereeniging	0·01	Wakkerstroom	0·02
Heidelberg	Nil	Potgietersrust	Nil
Lichtenburg	0·04	Krugersdorp	Nil
Pilgrims Rest	0·15	Joubert Park	Nil
Belfast	Nil	Johannesburg (Observatory)	Nil
Zeerust	0·01	Wolmaransstad	0·46
Middelburg	Nil	Pietersburg	0·03
Piet Retief	Nil	Louis Trichardt	0·33
Potchefstroom	Nil	Leydsdorp	Nil

Departmental Notices.

FARM EMPLOYMENT.

MR. E. SHARRATT, Brakwal, P.O. V. K. Kop, District Harrismith, Orange Free State, has a vacancy for an apprentice on his farm, where both general and stock farming are carried on. Youngish lad preferred, and one not afraid to work. [6]

Englishman, 19 years old, recently arrived in this country, desires employment on farm. Is strong and healthy and used to hard work.—ERIC SMITH, P.O. Box 1432, Capetown. [6]

Scotch tenant farmer, with life experience of pedigree and prize stock, desires management of stud or stock farm, or to assist on large ranch. Especially desirous of getting into touch with person wishing to import Clydesdales. Eight years in Africa; retrenched from Government service; testimonials and references; age 45; not married.—Apply A. W. DORMAN, Wessels Nek, Natal. [7]

Applicant, married, age 40, desires situation as farm manager. Fifteen years' experience in Natal—stock and agriculture. Proficient in dairy work and management. Good references.—"C", P.O. Box 17, Potchefstroom, Transvaal. [8]

Scotchman, married, 28 years of age, eleven years' experience of mixed farming and wattle growing in Natal, desires situation as manager on farm.—R. G. H., c/o Lake Hotel, Mooi River, Natal. [8]

NOTICE No. 617 OF 1911.

TENDER FOR STEAM PLOUGHS, TRAILERS, AND OX WAGONS.

Tenders are hereby invited for the purchase of the undermentioned commodities from the Department of Agriculture.

Sealed tenders, superscribed "Tender for the purchase of Steam Ploughs, Trailers, and Ox Wagons", must be addressed to the Chairman of the Tender Board, P.O. Box 376, Pretoria, and must be in his hands by 12 o'clock noon on Wednesday, the 30th day of August, 1911.

The steam ploughs were imported from Messrs. John Fowler & Co., Leeds, and Messrs. Aveling & Porter. The trailers were used in connection with the steam tractors, and the ox wagons have been converted into trailers.

Certain of the steam ploughs will only be available on the completion of their existing engagements, but some of them, as well as the trailers and the ox wagons, can be delivered upon the acceptance of the tender.

Particulars as to the make and cost of the ploughs, etc., the districts in which they are working, and the date upon which they can be delivered, can be obtained upon application to the Acting Under-Secretary for Agriculture, Pietermaritzburg, who will also arrange for the inspection of the machines, etc.

Purchasers will be required to take delivery of the ploughs, etc., at the places where they are at present working.

Payment may be made in twelve equal quarterly instalments bearing interest at 4 per cent. per annum, the first payment to be made on the acceptance of the tenders, but adequate and approved security for the due payment of the instalments must be furnished.

Any further particulars may be obtained upon application to the Acting Under-Secretary for Agriculture, Pietermaritzburg.

The Board reserves the right of accepting any portion of a tender without the whole and does not bind itself to accept the highest or any tender.

W. H. GILFILLAN,
Deputy-Chairman of the Tender Board.

Tender Board Offices,
Pretoria, 21st July, 1911.

GOVERNMENT NOTICE.

VACANT APPOINTMENTS—TRANSVAAL.

It is hereby notified for general information that the undermentioned positions are vacant, and applications for the same will be received by the Acting Secretary for Agriculture, Pretoria, up to 12 noon, on Wednesday, 16th August, 1911

Successful applicants will be required to enter into the usual three years' agreement, and if they do not possess a knowledge of the Dutch language on appointment, they will be required to learn it within a reasonable period.

(1) LECTURER IN VETERINARY SCIENCE.

Applicants must be members of the Royal College of Veterinary Surgeons, England, or hold an equivalent degree, and in addition to being capable of teaching Veterinary Science, should have experience in Veterinary practice. Salary, £350 per annum, rising by annual increments of £20 to £450, plus quarters for a single man, or £8 per mensem in lieu thereof for a married man, until such time as a house can be provided.

(2) LECTURER IN FIELD ENGINEERING.

Applicants must have a good theoretical and practical engineering training and be capable of

(1) giving instruction in land surveying and building construction;

(2) supervising and instructing students in the carpenter's and blacksmith's shops;

(3) conducting trials of agricultural implements and machinery;

(4) giving practical and theoretical instruction and demonstration of farming irrigation methods.

(5) conducting and recording the results of experiments to determine the amount of water used or necessary for the maturing of crops.

Salary £350 per annum, rising by annual increments of £20 to £450, plus quarters for a single man, or £8 per mensem in lieu thereof for a married man, until such time as a house can be provided.

(3) LECTURER AND INSTRUCTOR IN DAIRYING.

Applicants must be capable of lecturing to students on the scientific principles underlying the practice of dairy work as well as giving practical instruction thereon, and have a thorough knowledge of the management of dairy stock and experience in the control of a farm dairy. Salary £250 per annum, rising by annual increments of £10 to £300, plus quarters for a single man, or £8 per mensem in lieu thereof for a married man, until such time as a house can be provided.

School of Agriculture, Potchefstroom.

RESULTS OF DIPLOMA EXAMINATIONS, 1911.

The first examinations for the Diploma of the School were held recently, and the results of the examinations are appended, together with the regulations for the passing of the examination and obtaining the Diploma. Seventeen students sat for the examination in Part I; eleven of these were successful. In Part II, sixteen students sat for the examination; nine of these were successful in passing in all subjects, and thus obtaining the School Diploma. Four students are required to take special subjects again and three students must take the entire part again.

The following is a list of the successful candidates:—

Part I (in alphabetical order):—N. Barendregt, Guy Davies, R. K. Fletcher, C. Hardman, J. Malan, J. Marks, J. A. Nellmapius, C. A. Pereira, Chas. Preddy, G. H. Rissik, W. L. Worden.

Part II (in alphabetical order):—E. Biccard, E. Biermann, N. Johnston (with distinction in Botany and Veterinary Science), C. Lewis (with distinction in Entomology), H. Michaelis, E. Muhl, E. Quilliam (with distinction in Entomology and Veterinary Science), H. W. Ruscoe (with distinction in Botany, Entomology, and Veterinary Science), H. S. Woolf (with distinction in Botany, Entomology, Agricultural Chemistry, and Veterinary Science).

REGULATIONS FOR THE DIPLOMA.

The following are the regulations for the passing of the examination and obtaining the Diploma :—

(1) The course will extend over two years.

(2) The examination must be taken in two parts as follows :—

Part I at the end of one year's residence :

(1) Agriculture, including Poultry Work, Horticulture, Surveying, and Book-keeping.
(2) Botany.
(3) Zoology.
(4) Chemistry.
(5) Geology and Meteorology.

Final examination at the end of two year's residence :

(1) Agriculture, including Stock-breeding and Management, Dairying and Agricultural Economics.
(2) Agricultural Engineering, including Blacksmithy, Carpentry, and Building Construction.
(3) Agricultural Botany.
(4) Agricultural Entomology.
(5) Agricultural Chemistry.
(6) Veterinary Science.

(3) The maximum number of marks obtainable, and the minimum number of marks in each subject qualifying for the Diploma, will be as follows :—

	Maximum.	*Pass.*
Part I.		
Agriculture, etc.	300	150
Botany	100	40
Zoology	100	40
Chemistry	100	40
Geology and Meteorology	100	40
Part II.		
Agriculture, etc.	300	150
Agricultural Engineering, etc	100	40
Agricultural Botany	100	40
Agricultural Entomology	100	40
Agricultural Chemistry	100	40
Veterinary Science	100	40

(4) In order to pass the candidate must obtain an average of not less than 50 per cent. of the total maximum marks, and at least 50 per cent. in Practical and Scientific Agriculture.

(5) A candidate who obtains not less than 60 per cent. of the aggregate maximum marks in the subjects other than Agriculture will receive a First Class Diploma, provided that he obtains not less than 75 per cent. of the maximum marks in the subjects included under Agriculture.

(6) A candidate will not be entitled to take both parts of the examination at one time, except under very special conditions.

(7) A candidate who fails to obtain pass marks in more than one subject in Part I must take the entire part again. A candidate who fails in one subject only may sit again for that subject alone. A candidate who fails to obtain pass marks in more than two subjects in Part II must take the entire part again. A candidate who fails in one or two subjects only may take those subjects again.

(8) Weekly and terminal examination marks will be taken into account, and any student whose marks are unsatisfactory will not be entitled to receive his Diploma.

(10) Where applicable the examinations will be conducted by means of practical and oral examinations as well as written papers, and practical farm work throughout the course will be taken special account of in awarding diplomas.

A practical book signed by officials and staff certifying that all farm operations have been properly carried out must be submitted to the examiners.

The Agricultural Journal

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San Jose or Pernicious Scale.

The subject of San Jose Scale has of late occupied a good deal of attention, and owing to the recent discoveries of its existence in rather a severe form in the Transvaal, it occupies, unfortunately, a very prominent place in the current issue. The details we publish should serve to remove some of the misunderstandings which have arisen, and help to inform the public a little more fully on this subject. It was distinctly unfortunate that the earlier unofficial references to this discovery should have been put forward in the public Press in such a manner as to give rise to the impression that some one was inclined to raise a "scare". There is no cause for alarm or panic, for though this fresh infliction on the cultural industries of South Africa is serious, no possible good can be gained by exaggeration or magnification of its probable effects on the fruit industry. So far as the present information goes, there is just a chance that by means of careful investigation and inspection the more serious consequences may be averted, that is those not immediately attendant on all visitations of this nature. The matter has been taken very firmly in hand by the Chief Entomologist of the Union, Mr. C. P. Lounsbury, who is inaugurating a campaign against this pest, specially assisted by Mr. C. W. Mally, who, until recently, was Government Entomologist for the Eastern Districts of the Cape, and who, beside being one of the most experienced officers of this Division, has had previous experience in handling this pest in the United States. It is hoped, therefore, that this special trouble may soon be brought under control. The one difficulty is that the infection may have been spread very far, for it is difficult to trace a thing like this which spreads so insidiously. The nursery where the disease was discovered has sent out plants to many parts of the country, and every effort will be made to trace those, in order, if possible, to secure information as to the extent of the probable infection. The great pity of it all is that the scale was allowed to gain so long a start before being tackled. Not only has the scale been found in Pretoria, but in four places in Arcadia, in one at Sunnyside, and in one or more places in the suburbs of Brooklyn, Hatfield, Rietfontein, Gezina, Daspoort, Pretoria Gardens, and Mayville. It is also known to exist on three farms much further removed. The position is such, therefore, that it behoves all fruit growers in the Union, and others who are interested in gardening generally, to read with care the particulars which are published in this issue dealing with this rightly named pernicious pest.

Phylloxera at Pretoria.

It is mentioned for the information of the public that Vine Phylloxera (*Phylloxera vastatrix*) has been discovered by the Acting Chief of the Division of Entomology in a vineyard in the city of Pretoria. Several hundred vines appear to be affected, and the general circumstances suggest that the insect has been present for several years. Grafted vines procured from phylloxera-infected districts of the Cape are growing in another part of the vineyard, and it seems probable that the insect was introduced with them. It does not seem to be generally known that the American vine stocks, on which it is now customary to graft European varieties, are subject to the attack of phylloxera. They rarely succumb to the attack of the insect, but their roots may nevertheless become considerably infested. Some kinds are less troubled by the insect than others, and it happens that the kinds that are most useful in South Africa are amongst the less resistant varieties. It follows that as there has been a considerable introduction of grafted vines from infected districts of the Cape into the more northern Provinces for years past, it is practically certain that the pest has become established in many places through them. All introductions are supposed to have been fumigated, but the fumigation of vines requires special care to have it effective, and it is feared that the treatment was often faulty. The establishment of the pest at Pretoria does not necessarily imply that vines on non-resistant roots in and around the town are doomed to early destruction or to destruction at all through its influence. Under the conditions prevailing in the northern Provinces, the spread of the insect from centres of infestation is likely to be slow, and the injury to infested vines may long escape observation in the average case. Trellised vines are much more resistant than closely pruned standards. Phylloxera has been present in the Cape Peninsula for a quarter of a century, yet to this day one finds many old trellised vines apparently unaffected, and also not a few small vineyards of old standard vines.

Sale of Surplus Stud Stock.

The attention of stock farmers and others is drawn to the fact that a sale of surplus stock will take place at the Stud Sheep Farm, Ermelo, on Thursday, 5th October, when five Suffolk rams, forty-eight Tasmanian Merino rams, six Rambouillet Merino rams (fine woolled), three Friesland bulls, and four Aberdeen Angus bulls will be offered for sale by public auction. Catalogues will be ready in the course of the next few weeks, and copies of these, together with any further information, may be obtained on application to the General Manager, Stud Sheep Farm, Ermelo.

A Bee-keepers' Journal.

The hon. secretary of the South African Bee-keepers' Association (Mr. A. J. Chesterfield), P.O. Box 3653, Johannesburg, informs us that it is the intention of the above association to publish its own journal. The title of it will be *The South African Bee-keepers' Journal*, and publication is anticipated on 1st October. It is to be printed and published in Johannesburg, and will be wholly South African in character, and will be devoted exclusively to the interests of apiculture in South Africa.

Milk Records.

In an interesting article in the current issue Mr. Carruthers, of the Dairying Division, puts forward a strong plea for the keeping of milk records. If there is one thing more necessary than another in connection with the dairy industry of South Africa which is of really paramount importance it is this question of milk records. Some endeavour has been made in connection with the various agricultural schools and colleges to set an example in this direction with what result we have no method of recording. But that milk records are kept and appreciated among some of the more advanced of our dairy farmers we have evidence in the facts which come to our knowledge now and again. The great trouble seems to be to impress the general run of farmers with the importance of this subject.

At odd intervals we hear of cows with phenomenal milk production, just as quite recently a number of correspondents placed on record the remarkable fecundity of certain small stock in these pages. But what we never hear of is the careful selection of the progeny of such animals with the view to producing a tribe with similar tendencies. Many an ordinary cow which has gone to an inglorious and unhonoured death at the hands of the village butcher in South Africa would have been immortalized in other countries as the founder of a great tribe of milkers. People are apt to forget that everything must have a beginning, even the foundation of a great milking family of cattle. And it is to such animals as are now frequently forgotten when their day of usefulness has passed that the world owes its greatest breeds of milking stock. Their records are carefully kept and registered year in and year out. The records of their progeny are registered in the same manner and by scrupulous rejection and selection the herd is built up. In other words what the racecourse is to the thoroughbred horse the milk pail is to the best breeds of cattle. But the records of the milk pail must be as carefully kept as are those of the racecourse. This is a question not only for every dairy farmer but every cattle farmer to carefully ponder.

Lamziekte and Gal-Lamziekte.

In the current issue appears a very free and frank article from the pen of an experienced Griqualand farmer on the obscure subject of lamziekte or gal-lamziekte. We say obscure because this disease has hitherto baffled most people who have attempted to solve the problem of its origin and cure. But there are so many theories extant throughout the districts most affected that it is becoming increasingly difficult to obtain information which is not more or less permeated by one or the other of these. In view of this set of conditions, Dr. Theiler, who is taking this matter in hand, feels that some good may result from focussing these various views for the purpose of investigation later. To encourage others to express their views freely Mr. Dugmore's communication is published in its entirety. To some it may appear presumptuous for a mere farmer to give expression to theories on such a subject, but to these we would point out that had the theories and opinions expressed many years ago by experienced farmers in the Eastern districts of the Cape Province as to the

pestilential character of the tick been heeded and followed up a great deal of the mischief which has since ensued might have been avoided. And one might go even further than this in demonstrating the great value of first hand observation by experienced and intelligent farmers, were it necessary. We therefore ask all the readers of the *Agricultural Journal* who have any experiences to record in connection with this disease to communicate as early as possible with Dr. Theiler, the Director of Veterinary Research, and not to hesitate to state the whole of their case. It must not be supposed that because a theory may break down on test, as has so often happened in connection with this disease, that it follows as a matter of course that the theory contains nothing of value. Its value may even be of a negative character, but it is none the less valuable and worth putting to the test. It is quite understood of course that Dr. Theiler does not necessarily agree with all that may be published from correspondents on this subject. The object of publication is to place on record the views of those interested.

Rooibloem in Mealies.

The first report from Prof. Pearson on the occurrence of the parasitic weed known as Rooibloem among the maize crops of the Transvaal appears in this issue. It is of the greatest interest from the practical point of view as it offers some sort of possible relief from the pest if the farmers whose lands are infested will only follow the instructions given. The danger to avoid is that of being led away by false appearances of relief. In this case, as in that of many similar infestations, apparent relief is noticed when the host crop is kept off the infected lands and another crop substituted. Then the witch-weed disappears, the reason being that its particular host is absent and it does not parasitize on the plants of the new crop. That no real relief is obtained in such circumstances is shown by Prof. Pearson, for, as he so clearly points out, when the host crop is again sown in the land the pest may be as bad as ever for the simple reason that the seeds live on in the ground and only germinate when the conditions are favourable. Some farmers are fully convinced that this pest can be obviated by sowing a crop of Teff grass. To all appearances this is the case, but it is very doubtful if the relief lasts any longer than the crop of Teff. So soon as mealies are again sown in the lands, or any other crop upon which the rooibloem can parasitize, the chances are largely in favour of a repetition of the trouble. Now as this is a vital matter for the farmers of the Transvaal owing to the danger of the pest spreading to uninfested lands the advice of Prof. Pearson is the safest to follow. That is, every endeavour should be made to prevent the rooibloem from seeding down, for in that way, and that way only, can we make certain of getting rid of this pest. The mealie crop is too valuable to this country for us to run any risks. Its full value has yet to be appreciated, but it is beginning to be realized that it is possible to make it one of the main stays of the whole Union. It is all the more important therefore that steps should be taken as early as possible to eradicate the one pest which now threatens this great crop with injury. The proverbial stitch in time is now needed. But above all, make-shift remedies should be most rigorously avoided.

Wet Maize for Export.

Exporters of maize, or some of them, seem determined to do as much as they can towards damaging the industry they are supposed to be building up. There are of course honourable exceptions, but the fact that a number of consignments railed to the ports for oversea markets are found to contain such an excess of moisture as to render them unfit for export points to the belief that many in this trade are not very deeply concerned as to its best interests. The Chief Grain Inspector has found it necessary during the past month to issue warnings through the public press and these are more than justified by the facts. The most remarkable feature of this subject is that it is a real loss to the exporter, for in the first place it costs something like 1s. 6d. to dry maize at the coast whereas it can be done for something like a tickey a bag on the farm. And in addition to that when wet maize is presented to the grader and it has to be dried at the port that fact is endorsed on the certificate and the value of the maize is lowered accordingly to the buyers on the other side. As South African maize has gained an excellent reputation in the European markets, it seems a pity to run the risk of endangering that reputation by carelessness. Producers and merchants alike should join in an endeavour to do all they can rather to enhance that reputation by using the utmost care in seeing that no damp or otherwise faulty grain is shipped. Even though the late season was very exceptional there is in reality very little excuse for the railage of damp grain for the coast. It should in all cases be first carefully ascertained beforehand that the grain is in a sound and merchantable condition. If this were done there would be less complaint on this score.

In those cases where it is thought that the grain is damp both growers and merchants can always satisfy their doubts by submitting samples for test. The Agricultural Department through the Grain Inspecting Branch is always willing and even anxious to assist in this direction. Tests are carried out at a nominal cost of 3d. per sample, so the cost should not stand in the way. The samples, which should be enclosed in an air-tight receptacle, should consist of at least one pound weight of maize, which should be representative of the bulk from which the samples are taken. Such samples can be forwarded by "Agricultural Parcel Post", addressed to any of the undermentioned officials:—

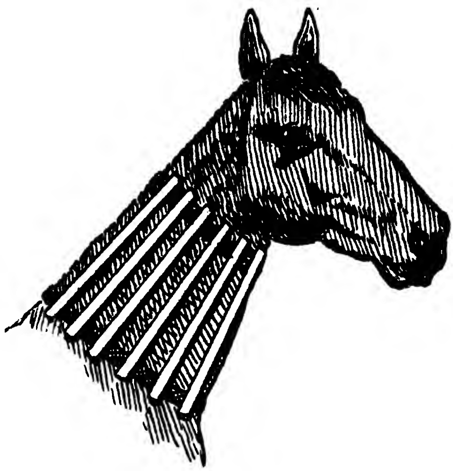
Chief Inspector of Grain, Department of Agriculture, Pretoria.
Government Grader, Point, Durban.
Government Grader, Alfred Docks, Capetown.
Government Grader, East London.
Government Grader, Port Elizabeth.

National Irrigation Congress, U.S.A.

Attention is invited to the fact that, under Government Notice No. 644 of 1911 (*Union Gazette*, 4th August), any persons desirous of attending at their own expense the Nineteenth Session of the National Irrigation Congress of the United States of America, to be held in Chicago in December next, may obtain credentials from the Government upon communicating with the Acting Director of Irrigation, Pretoria.

Horse Cradle for Prevention of Gnawing, etc.

Mr. W. G. Halford, of Bedford Farm (P.O. Box 305), Johannesburg, writes:—I enclose a rough sketch of a horse-cradle which is used to prevent horses gnawing either themselves, when blistered, or their clothing. I think this contrivance might prevent a cow sucking



herself. The cradle consists of a series of short staves bored to receive a cord. The distance between the staves is regulated by placing wooden discs or bobbins on the cord which keep the staves apart. The bottom of the cradle being much larger than the top, more bobbins would be needed to produce the enlarged measurement.

Agricultural Development in Rhodesia.

As was stated in a recent note in the *Journal* in connection with the appointment of Mr. Loudon M. Douglas as Technical Adviser on Animal Industries to the Rhodesian Administration, the Directors of the British South Africa Company have decided to make a strong effort to develop the agriculture of the country in the direction of the production of bacon and meat. Mr. Douglas has now definitely taken the work in hand, and has issued a memorandum embodying his proposals in regard to the forwarding of this movement. These include (1) the establishment of agricultural credit associations so that cheap capital may be available; (2) the development of swine husbandry and bacon curing, not only as the natural corollary of dairying but as a distinct industry, dependent only upon such cereals as grow easily in Rhodesia, and which can be utilized for profitable feed (the principal cereals to be thus dealt with are kaffir corn, mealies, barley, oats, and beans); and (3) the creation of a meat industry which shall have for its ultimate object the export of fresh meat either to the neighbouring South African Union or to the United Kingdom and Continent of Europe.

Hail Insurance.

The insurance of crops against damage by hailstorms, so far as South African conditions are concerned, appears to have been solved by a body of farmers in East Griqualand, who have banded themselves

into an association for the purpose of providing for such insurance. The name the association has adopted is the East Griqualand Mutual Hail Insurance Society, and the headquarters are at Kokstad. According to the rules and regulations of the society, crops cannot be valued for more than the following amounts per acre, viz.:—Wheat, £2. 10s.; oats, £2. 10s.; barley, £2. 10s.; mealies, £1. 10s.; other cereals, £2; potatoes, £10; and the following premiums are charged on the insured value of the crop:—Wheat, 5 per cent.; side and winter oats, 5 per cent.; Cape, Algerian, Egyptian, and Sidonian oats, 4 per cent.; barley, 4 per cent.; mealies, 2 per cent.; other cereals, 5 per cent.; potatoes, 1 per cent. Upon damage by hail being sustained by any person whose crops are insured, the crop is examined and the extent of the damage reported to the society by two assessors, and the society refunds accordingly so far as the funds permit. In the event of the claims for damages sustained being in excess of the funds of the society, the claims are paid pro rata.

Exhibition of South African Fruit.

It is proposed to hold an exhibition of South African fruit and vegetable products at the Royal Agricultural Hall in London early in 1912, in connection with which the Royal Horticultural Society has agreed to give medals and awards for the best exhibits. The exhibits will consist of (*a*) fresh fruit of all varieties in season at that time; (*b*) dried fruits, preserves, jams, pulps, canned fruits, etc.; (*c*) tobacco and wines; and (*d*) vegetable products, such as fibres, cotton, cereals, herbs, aloes, argol, etc. The exhibition will be entirely in the charge of the official representatives of the Union Government in London, who will be guided and advised by the committee of the Royal Horticultural Society and leading fruit dealers in London; and it will be conducted on purely business lines with a view to advertising South African fruit and vegetable products in England.

In order to make a success of this exhibition, particularly with a view to the establishment of a sound export trade of South African products, it is most desirable for the department to receive the assistance and co-operation of all the various agricultural unions, farmers' associations, co-operative societies, and similar bodies in South Africa; and such bodies, as well as private producers, are invited to communicate with the department on the subject. Exhibits will be accepted on the following conditions:—(1) The exhibits to be properly packed for export, labelled, and marked with the grower's name, address, and trade-mark (if any), and to be delivered free of charge to the Government at the railway station most convenient to the producer. (2) The Government reserves the right to return to the owner and to decline to exhibit any products which are considered to be below the desired standard; and undertakes to bear the railage, freight, and all other expenses here and in England in connection with those exhibits which are accepted on condition that they become the property of the Government, who will have the right to dispose of them after the exhibition for the purpose of recovering some portion of the expenditure incurred. As the date of the show has not yet been fixed, it is not now possible for the department to state exactly when the exhibits will be required, but it will probably be some time between the 1st and 15th February next.

Unsigned Letter.

An uncompleted and unsigned letter, referring to the dispatch of a box containing back numbers of the *Transvaal Agricultural Journal*, has been received from a correspondent, who writes from Lucky Bean Mine, P.O. Turkois, via Gatooma, Rhodesia. If correspondent will please send his name we shall be in a position to communicate with him on the subject of his letter.

The "Rain Tree" of Peru.

Mr. T. C. Bousfield, of Stutterheim, Cape Province, has forwarded a letter which he has received from the British Vice-Consul at Lima in response to a request for information as to the authenticity of the so-called "rain-tree" of Peru. The Vice-Consul writes:—"The article published in *Chambers' Journal* on the rain-tree—*Tamaccaspi* (Quechua)—of Peru, has brought to this Vice-Consulate letters from different parts of the world, asking for seeds, etc. The subscriber regrets to say that, although there is a vague rumour of the existence of such a tree in the Amazon basin, neither the Lima Geographical Society nor the Government Department of Agriculture have been able to obtain any concrete information about such a plant, which would be of the greatest service on the arid coast of this country." This, coming from Peru, should be sufficient to convince farmers and others who have been attracted by reports of this wonderful "rain-tree" that the proverbial grain of salt is an advisable accompaniment to the digestion of such sensational articles as we have been treated to during the last six months or so.

The Stork or Locust Bird.

Mr. M. Vorster, writing from Devon (Transvaal), says:—On close inquiry we find in the stork a friend of unusual value. In the past it has not been found here or at any rate not often. It has a long thin neck and a long red beak, which enables it to easily pick up and swallow such insects as locusts, snakes, etc. Its colour is black and white, with long red legs, and a white breast. In the summer storks are often to be found on the high veld, but they generally disappear in the winter. They are fairly tame, and may be approached to within a distance of a few paces. They visit us from oversea. Their domicile appears to be Austria, whence they travel through Palestine and the Arabian Desert, over the Red Sea, and through Central Africa, thus covering considerable distances. In Austria it is the practice of the Ornithological Society to place a ring on one of their legs with the number and the place at which they were liberated marked thereon. These marked birds are caught here, and thus furnish a proof that they have journeyed over many countries. The finder of a bird thus marked with a ring is invited to report it to the Ornithological Society and to return the ring.

The stork is of incalculable value to the farmer, inasmuch as it exists on locusts and other insects injurious to agriculture, such as the frog, crab, etc., which it catches in dykes and dams. Their habits are different to those of other birds. They seldom fly, and then only because their supply of food has become reduced or exhausted. They

dispose themselves over the veld either in groups or singly, but sometimes a large number fly in one direction while the remainder set off for a different point. When they have fed sufficiently long at one point they usually leave. Their habits do not change; slow in walk and manner, they are nevertheless of a particular build designed to combat many influences. They are thus not subject to climatic conditions or affected by the changes of nature. They flourish in cold as well as in warm lands so that their habits do not adversely affect their health, but they prefer the warmer parts during the winter. They feed readily on different kinds of insects and animals.

They are found in greater numbers in one year than in another, and this fact furnishes an indication that they play a part different to that of any other bird. They have no fear for wild animals because they are as much at home in the bush as in the high veld. It is an established fact that they only lay during our winter, because we know little or nothing of the situation of their nests. A comparison of the stork with other birds brings us to the conclusion that its most conspicuous feature is its fondness for travel. Storks are found everywhere and they are accustomed, at certain periods of the year, to choose a particular direction and migrate to any part of the world. In the animal world the stork is a great friend to the farmer.

Seeds for Disposal, Potchefstroom.

In order to prevent disappointment, farmers are advised that all seeds for the next season's crop available for disposal from the Experiment Farm, Potchefstroom, have now been allotted to the different applicants, and no further applications can be considered.

San Jose Scale in the Transvaal.

Aspidiotus perniciosus, Comstock.

By C. B. Hardenberg, B.A., M.A., Transvaal Entomologist.

Of all pests which attack fruit trees, the San Jose scale is considered the worst, and rightly so. Other scale insects may attack a tree for a number of years without any great injury, its vitality being only slightly impaired, though in time the death of the tree might result, but once the San Jose scale becomes established the days of the tree are numbered, as this scale, if unchecked, may cause the death of the tree in two or three years. It is, therefore, with great regret that we must record the presence of this pest in the Transvaal, which was noticed a few weeks ago. Unfortunately, circumstances seem to prove its existence in this Province for a number of years, and it becomes doubtful whether we will be able to completely trace the distribution of the infested consignment on which it was introduced so as to enable us to locate all the infested trees, and by prompt, vigorous action eradicate the scale.

Its Introduction.

From circumstantial evidence we must infer that the scale gained entrance into this Province some six years ago on a large consignment of fruit trees imported from Australia. The consignment consisted, we were informed, of about 16,000 miscellaneous fruit trees, apples, pears, plums, and peaches, and owing to the difficulty in detecting the scale if present on isolated specimens, apart from the practical impossibility of minutely examining every tree and twig in a consignment of this size, it is quite possible that a small number of scales escaped detection. As the consignment came from a reliable nurseryman in Australia, who probably had subjected the trees to fumigation before dispatch, it is evident that the chance of any live scale entering with these fruit trees was minimal. We must assume, however, that either a few mature scales, or some young within the parent body of the female, escaped destruction by the fumigation, and thus become the source of an infestation which may cause inestimable losses to our fruit growers. No blame can be attached to the importing nurseryman, as the stock was ordered from a reputable grower, and by fumigation each year and application of lime-sulphur wash he tried to keep his stock in clean condition.

Slowness of Spread of Scale.

That, except in an isolated case, no report has been received of any damage caused by this scale may be attributed to two causes.

(*a*) The infested stock was fumigated and treated with lime-sulphur wash each year. This treatment checked the scale to such an extent that in all probability only a few live specimens remained on a few of the trees, so that the majority of those sent out from the nursery contained no live scale.

San Jose Scale in the Transvaal.

Apple branches, showing crusted Infestation, natural size.
(Original photograph from Transvaal specimen.)

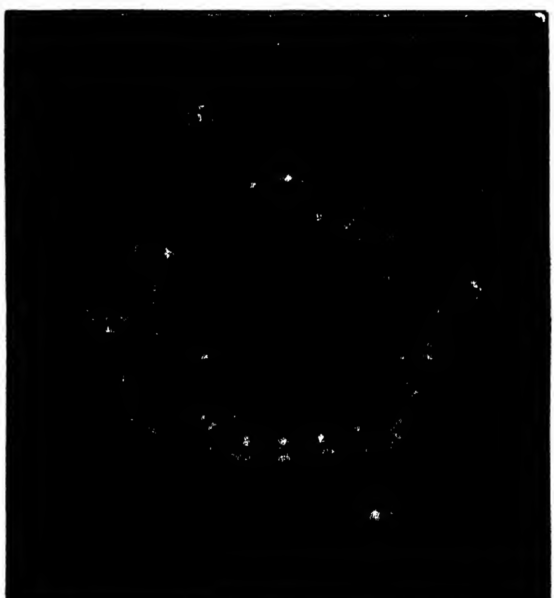
(*b*) Fortunately, this country is still sparsely settled, and the farms and orchards are widely separated, thus even if the scale became well established at one place the chances of its spread to neighbouring farms are remote.

WARNING TO FRUIT GROWERS.

Notwithstanding the apparent slowness of its spread at present, the danger of this pest becoming well established must not be ignored, for once the scale has gained a good hold the injury caused by it will be truly enormous, and we therefore confidently expect that all the farmers and fruit growers who suspect the presence of this scale in their orchards will notify us, so that steps can be immediately taken to have this scale eradicated on their premises.

DESCRIPTION OF THE SCALE.

To the ordinary observer, the scale appears as small, grey, circular flakes, surrounded by innumerable small, black circular dots, crowded very closely together. Upon closer examination we find that the round, grey flakes consist of a circular scale, a little less than one mm.



Adult female with young scale clustered about her; very much enlarged.
(From Bulletin No. 193, New York Agricultural Experiment Station.)

in diameter, and shows two more or less distinct light rings, separated by a dark one, while in the centre there is a yellow nipple. These are the mature females. The male scale is similarly constructed, but is oval in shape, with the nipple towards one end. The small, immature, black scales are only one-quarter to one-half the size of the grey scale, and are more or less dull black, with a crater-like depression in the centre. They are generally very closely crowded around the edges of the mother scale, and the entire conglomeration of mature and immature

scales gives the appearance of a deposit of ashes on the twigs and branches of the tree. The trunk and larger branches of the tree are generally so densely covered with mature scales that it represents a solid grey flaky mass, while on the twigs and younger branches the small black button-like scales predominate, and where the young scales have settled a red discolouration can be observed as a ring around the place where the young scale is feeding. The photographs show these scales natural size.

The original home of the scale has long been in doubt, but it appears to have come originally from China, and was introduced in Japan, Chile, United States of America, Canada, Hawaiian Islands, Germany, Australia,* and Tasmania†. It was in the United States that the greatest serious damage was done, and, first noticed in San Jose, California, in 1873 (hence the name), it was described by Comstock in 1880, who named it prophetically *A. perniciosus*—the pernicious scale. That the name was well deserved was soon proved by the enormous losses it caused to fruit growers, and the rapid spread, as in about fifteen years it had gained entrance into most of the North American States, and had established itself so firmly that all efforts at eradication were abandoned, and only methods could be devised for its control. Especially in the United States, this scale has been the subject of thorough investigation (the bulletins and other publications on this subject number over two hundred), and the following data in regard to the life history is a brief résumé of the results of the experiments and studies by our American colleagues.

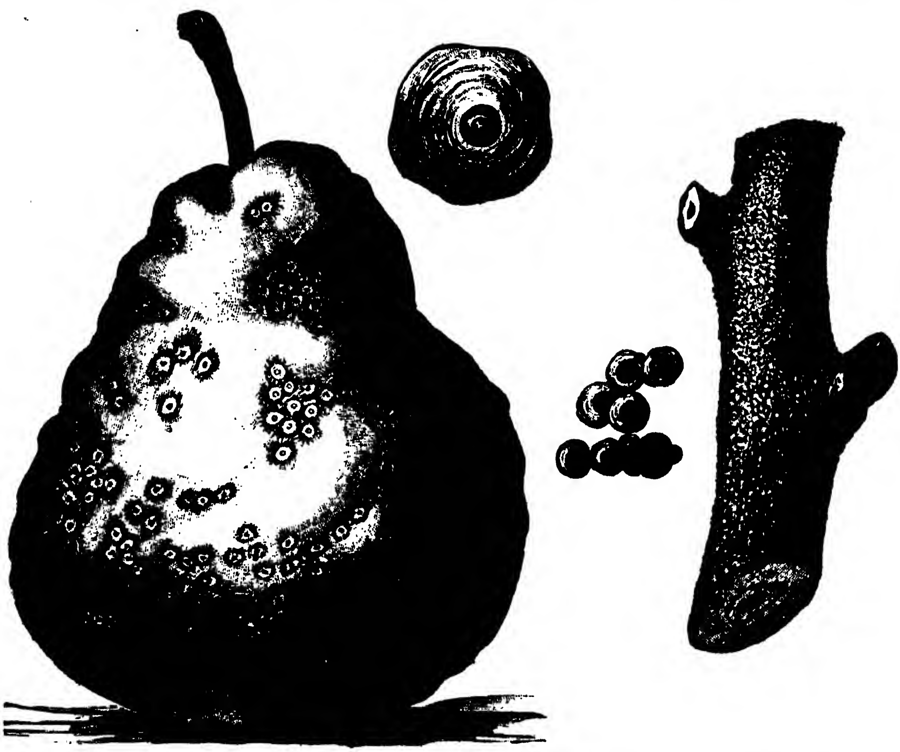
LIFE HISTORY.

The San Jose scale belongs, like the red scale, Rossi scale, and many others, to the great group of armoured scales, so called because the insect itself is concealed beneath a scale, which is formed by the secretion of waxy filaments from the body. Underneath this covering the young are produced. The San Jose scale is viviparous, that is, the egg is retained in the body of the parent until the larva is formed, and upon emergence is fully developed and able to move about. For a short period the young insect enjoys free locomotion, and travels actively in search of a favourable place to settle and attach itself. This period of activity may last from twelve to forty-eight hours, during which the larva may travel along twigs, leaves, and fruit, or carried by birds or insects to other trees, but in a great many cases they will be found to settle down almost immediately, surrounding the parent scale. The young larva is pale yellowish in colour, very minute, with an oval body, three pairs of legs, and two feelers or antennae. The long sucking tube, which is about one and a half times as long as the body, is carried folded beneath the insect. In travelling about they prefer smooth surfaces, and do not travel far over any rough ground. They soon settle down and insert their proboscis, or sucking tube, through the bark or epidermis of the leaf, or the skin of the fruit (wherever they happen to attach themselves), and then the period of activity ceases and begins the period of growth. Waxy filaments spring from all parts of the body, and, becoming more dense, soon cover the insect with a downy coat. Within six to eight hours after the first filaments appear the insect is entirely concealed underneath this white fluffy material. These filaments now become matted

* Mentioned in Froggatt's "Australian Insects", p. 373.

† Arthur M. Lea, "Insects and Fungus Pests of Orchard and Farm", 3rd Ed., p. 64.

together and harden, thus forming the scales, while the central hairs at first remain as a white tuft, but gradually disappear, leaving a slight depression at the apex of the scale. The newly-formed scale, at first white, soon becomes grey and gradually darker, until the entire scale is a dull black. In this condition the scale passes the winter, and as soon as the temperature rises to above 60° F. the further development starts. The scale is enlarged by the secretion of more waxy fibres, which protrude from underneath the young scale on all sides, and in time turn a dark grey. Up to the time of the first moult (which takes place about ten to twelve days after birth) there is no difference between male and female, but from this point they are no longer



Aspidiotus perniciosus on pear fruit and twig, with enlarged male and female scales.
(From original illustration in United States Department of Agriculture Year-book, 1894.)

similar. The male becomes long, pearshaped, and has large, purple eyes, while the female becomes almost circular, and is without eyes. In both sexes the legs and antennae have disappeared. After about six days more the male moults again, and thereby changes into the pro-pupal stage, a new pair of antennae appear, the large purple eyes are set close together, wing pads extend along the side of the body, and the terminal segment ends in a strong point. The entire body is pale yellow, long oval in shape, while the covering scale becomes elongate, sometimes slightly curved, with the cast larval skin towards the anterior end. After a couple of days the male moults again, and now changes into a true pupa, which stage lasts about four to six days, when the male changes into a winged insect and emerges backwards from underneath the scale.

The mature male is an orange-coloured insect, with long, many-jointed antennae or feelers, and two iridescent wings, while the body ends in a pointed style.

The female insect does not change materially in appearance with the successive moults, but only becomes larger. In about thirty days from birth the females are mature, and begin the production of young. They are enormously productive, the number of young produced by one female having amounted to a little less than six hundred, with an average of about four hundred. The reproductive stage lasts about six weeks, during which time young are being produced continually at the rate of about nine to ten a day. It follows, therefore, that practically all the time we find scales in different stages of development, from newly-hatched young to mature reproducing females. In such countries which have a winter, where the temperature goes below freezing for a long period, only such scales as have reached the black button stage (or beyond) survive, but in this country we may safely assume that development keeps on all the year round, for experiments have shown that growth and reproduction are again resumed as soon as the temperature reaches 60° or above. It can therefore not be wondered at that the attacked trees very soon show the effect of this scale. In the orchard where this scale was found, the affected trees could be immediately recognized by their stunted growth, having reached only a height of about five feet, while other healthy pear trees of the same age had shot up to fourteen feet.

FOOD PLANTS.

The number of plants which serve as suitable hosts for the San Jose scale is very large, which makes its eradication extremely difficult, if not impossible, if the scale once becomes established in an orchard or garden. A partial list of food plants is here given,* and probably a good many more might be added. Though none of these trees are native to this country, nearly all of them have been introduced here, and no doubt the scale will find many of our native trees to its liking also:—

Pear.	Strawberry.	Pecan.	Cotoneaster.
Peach.	Raspberry.	Black walnut.	Euonymus.
Apple.	Gooseberry.	English walnut.	Huckleberry.
Plum.	Grape.	Japan walnut.	Linden.
Cherry.	Currant.	Rose.	Acacia.
Persimmon.	Almond.	Hawthorn.	Elm.
Quince.	Chestnut.	Spirea.	Osage orange.
Japanese quince.	Alder.	Sumac.	Akebia.
Willow.	Milkweed.	Catalpa.	Poplar.
Silver maple.	Loquat.	Laurel.	Juneberry.
Snowball.	Red dogwood.	Citrus trifoliata.	
Actinidia.	Mountain ash.	Cut-leaved birch.	

DISTRIBUTION OF THE SCALE.

The principal means of distribution over considerable distances is the distribution of infested nursery stock. However, a reliable nurseryman will not allow any stock to leave his premises without thorough fumigation, and although in isolated cases a limited number of scales might escape destruction, the danger of contagion by unclean trees from a nursery is minimal. It must be evident, however, that the

* From Bulletin No. 12 N.S., U.S. Dept. of Agriculture, Bureau of Entomology, 1898.

practice of buying or accepting stocks, scions, or buds from a friend or neighbour's orchard for propagating is an exceedingly dangerous one, as the owner, unknowingly, may thus distribute infested material.

The insects are very seldom carried by the wind, as the young larvae as a rule do not cling tenaciously to the leaves, and would drop off long before this had been carried to another tree. They are, however, readily transported by insects, such as grasshoppers, aphis lions, flies, and beetles, and the birds are probably also instrumental in the spreading of the scale.

CONTROL OF THE SAN JOSE SCALE.

(*a*) *Natural parasites.*—Several enemies of the San Jose scale have been reported. Of the small hymenopterous parasites may be mentioned *Aphelinus fuscipennis*, How.; *Aphelinus mytilaspidis*, Le B.; and *Aspidiotiphagus citrinus*, Craw. The material collected in the Transvaal, however, did not show any signs of having been parasitized, but, as the first mentioned is a common and widespread enemy of armoured scales in general it is probable that it will prove of assistance here in keeping the scale in check.

Several lady-birds have also proved effective in devouring the scale, and no doubt our native scale-feeding Coccinellids will acquire the habit of preying on the newly introduced scale.

Fungus Disease.—The fungus *Sphaerostilbe coccophila* has been reported as keeping the scale greatly in check in Florida. This fungus also lives upon other scales of the armoured group, and we have found it in the Transvaal infecting the red scale and the greedy scale, and we have no doubt that in localities which are sufficiently moist this fungus will prove of great benefit.

Remedial Measures.

We can, however, not rely on these natural agencies, which may be locally absent or not sufficiently numerous to be effective, and the application of artificial means must be resorted to.

(*a*) *Fumigation with hydrocyanic acid gas.*—The fumigation of trees by means of potassium cyanide and sulphuric acid has become so well known now to fruit growers that it is not necessary to go into details of the operation. Suffice it to say that a fumigation at a strength of one ounce of cyanide, one ounce of sulphuric acid, and two ounces of water to every hundred cubic feet of space enclosed, has proved entirely effective in killing the scale in all its stages without injury to the tree, which application should, of course, best be made during the winter season.

(*b*) *Spraying.*—Pure kerosene oil, if applied in a fine, misty spray, can be safely used during the dormant season on apples, pears, and quinces. The kerosene should not be applied in such quantities as to let it run down the trunk and collect at the base of the tree, as otherwise injury might result. Peach trees, however, are very easily injured, even by a mixture of kerosene and water, containing only 20 per cent. of kerosene, which is not strong enough to kill the scale. Plums, though not so easily injured as peaches, show injurious effects from repeated application, so that, except for apples, pears, and quinces, the kerosene treatment would not be advisable.

Caustic soda-whale oil soap applied at the rate of ten pounds to one gallon hot water (in winter time) will kill the scale without any

injurious effect to the tree. The best treatment, however, is the lime-sulphur wash in the winter, and we would strongly advise this wherever there is any suspicion of this scale being present. The scale need not be dreaded wherever this treatment, especially with occasional fumigation, is practised, and the trouble and outlay will be amply repaid in checking this injurious pest before it has spread to such an extent as to make its extermination impossible.

SAN JOSE OR PERNICIOUS SCALE.

Note by CHAS. P. LOUNSBURY, Acting Chief, Division of Entomology.

THE high importance of the San Jose or Pernicious Scale as a horticultural pest leads me to supplement the article, which is published in this issue of the *Journal* under the name of the Transvaal Entomologist, with a few paragraphs on the discovery and the present known distribution of the insect in this country, and also to give a few extracts from an American publication on the insect.

The insect is most commonly referred to in books as the San Jose (pronounced San Ho-zay) Scale, but it is better that the name Pernicious Scale (from its specific name—*perniciosus*) be used to designate it in this country. Fear of its introduction is one of the chief reasons for the very severe restrictions that have been imposed on the importation of nursery stock into South Africa. The older entomologists of the country have always feared that it might have got in with the extensive importations of nursery stock from Australia into the northern colonies that took place shortly after the late war, and while importations were still practically unrestricted, but until within a few weeks it was not actually known to be anywhere in the Union.

It may not be generally known that the pest was discovered by Mr. C. W. Mally in his inspection of two consignments of Australian trees at Capetown in 1900. The confiscation and destruction of those consignments, which together were valued at £500, discouraged Australian tree agents from attempting to do further business in the Cape Colony, but they later developed a brisk trade in the Transvaal and Orange Free State. However, when nursery legislation was secured in the several colonies, and the inspections of year after year disclosed that the nurseries were apparently free of the trouble, the fears that the pest was in the country gradually subsided, and the alarming revelations of the last few weeks have come like the proverbial "bolt from the blue".

The credit of discovering that the insect is in the country belongs to Mr. W. Moore, the Lecturer in Entomology for the Government Agricultural College at Potchefstroom. The Transvaal Entomologist, Mr. C. B. Hardenberg, had let Mr. Moore have a miscellaneous collection of scale insect material to study, and in the collection, quite unsuspected by anybody, was this particular species. In the course of time Mr. Moore came upon it and recognized it, and, of course, at once reported his find to Mr. Hardenberg. The scale was on cuttings which Mr. R. A. Davis, the Transvaal Horticulturist, had brought to the Transvaal Division of Entomology over a year ago from the orchard alluded to in Mr. Hardenberg's article. Mr. Davis had said that the trees were severely infested, and that he thought their condition a

reflection on the inspection of the nursery from which they had come, but the species was mistaken at the time for a common one of little importance as a pest, and the cuttings were put away.

After Mr. Moore's discovery, the nursery from which the trees had come was visited by Mr. Hardenberg, and the scale found to be there. The trees were part of a consignment of over 15,000 that had been imported in 1904 from a Victorian nursery of high repute, and a few hundred trees of the original consignment were still in the nursery. As Mr. Hardenberg tells, those trees were uprooted and burned at once. But the scale was by no means confined to those trees. It was later found by the writer to be present on other nursery stock and on many permanent trees scattered throughout the whole nursery of four to five acres. The nursery is in Pretoria, and though it is largely a floral establishment it does a good trade in roses and other ornamental garden plants, and has distributed a not inconsiderable number of fruit trees in the last few years. No blame whatever appears to attach to the proprietor or his manager. They seem always to have striven to carry out the recommendations of those responsible for the inspection of the nursery. It is still an open question whether the scale came with the large consignment of stock imported in 1904, or with an importation of 290 trees which took place in 1907, or in some other way, but it appears to have been in the nursery at least four years. A few small trees on the premises have been killed by it, and some large ones have become very badly infested. Altogether, it is inconceivable that it has not been scattered far and wide by out-going stock.

The first place known to be infested was an orchard near Bronkhorstspruit. Infestations near Benoni and at Gezina (a Pretoria suburb) have since come to light, and also one in the part of Pretoria called Arcadia. Infested trees at all three places trace to the one nursery. Doubtless the scale has spread more or less from centres formed by trees introduced from the nursery. It is present in a garden adjoining the nursery, and in others across roads that bound the nursery on two sides. Inspection for it has only just begun, and the writer will not be surprised if it is found widely distributed in Pretoria and suburbs. Cape fruit growers may find some satisfaction in the knowledge that the writer has taken direct charge of affairs, and that Mr. C. W. Mally, the Acting Cape Entomologist, has been requisitioned to assist. Mr. Mally had years of experience in suppressing the pest in Ohio nurseries and orchards. It is hoped that at least the further spread of the insect with nursery stock will be prevented.

The climate at Pretoria appears to suit the insect. Its observed occurrence in Arcadia is in a large private garden, to which it was evidently taken in 1907 with one hundred apple trees from the infested nursery. None of the trees have made satisfactory growth; thirty-five of them are now standing dead or are missing, and fully half of the remaining sixty-five are so thickly encrusted with the scale that they would, in all probability, succumb in a few months if left untreated. As might be expected, other plantings of trees on the estate have become infested.

As Mr. Hardenberg states in his article, the scale has numerous food plants. In the United States about seventy species of plants are recorded as becoming " commonly or badly infested ", about as many more as " occasionally or rarely infested ", and about an equal number as " not infested ". The trifoliate orange (a deciduous plant) is placed in the first class, and the sweet orange in the second class. Californian

experience, however, clearly proves that the insect has no importance whatever as a pest of the common citrous fruits. About half of the badly-attacked plants are members of the rose family, the family which includes apples, pears, quinces, plums, cherries, hawthorns, and roses, all of which kinds of plants are liable to attack. Vines are little attacked, and oaks are said to be immune, as are also coniferous trees in general, although arborvitae is placed amongst the "occasionally or rarely infested" plants. The position of Eucalypts seems to be doubtful, but it seems unlikely that any kinds suffer seriously.

The following extracts from Bulletin No. 62 (C. L. Marlatt, 1906) of the Bureau of Entomology of the United States Department of Agriculture emphasize the serious nature of the pest, and indicate how it is chiefly disseminated:—

"Probably no other insect has had so much notoriety as has this species, and certainly none has assumed so great an international importance, as indicated by the vast amount of interstate and foreign legislation which has been enacted relative to it. . . . It is inconspicuous and often for a time passes unnoticed or unrecognized. Meanwhile its enormous fecundity enables it to overspread the trunk, limbs, foliage, and fruit of the tree attacked, so that it is only a question of two or three years, unless proper remedial steps be taken, before the condition of the plant becomes hopeless or its death is brought about. In capacity for harm this species probably exceeds any other scale insect known, and it attacks practically all deciduous plants, both those grown for fruit and the ornamentals. Its economic importance is further increased by the ease with which it is distributed over wide districts through the agency of nursery stock, and the difficulty and, as a rule, impossibility of exterminating it where once introduced. . . .

"The transportation by nursery stock or scions or budding and grafting material . . . is unquestionably the usual and principal means of carrying the insect to a distance. . . . The San Jose scale is also frequently carried about on fruit, particularly of the apple and pear. The young scale insect goes out on the fruit, and in the case of badly infested trees there is usually a good deal of scale on the fruit particularly, massed at the blossom and stem ends. The scale may go on breeding on such fruit and the young may be found crawling about on the fruit and in the boxes. Such fruit is commonly shipped to remote points, and infested fruit may be found quite commonly in the markets of this country; and when attention was drawn to the San Jose scale by its first developing in the East, infested fruit from California could be found in almost any of the fruit markets of the principal eastern cities. The shipping of infested fruit from California had been going on for a great many years, and in spite of its wide dissemination in this country, and to some extent abroad, there is not, so far as the writer knows, a single authenticated instance of the scale having been established from such material. The possibility of it, however, undoubtedly exists, but the danger seems to be inconsiderable. . . .

"The local spread of the insect from orchard to orchard and from tree to tree must also be brought about through the agency of means other than those under the control of the insect itself. The female is wingless and after once becoming fixed can not move. The young lice, as before stated, are active, crawl rapidly, and may reach other trees, but this is rare unless the limbs interlace, since we have shown by breeding-cage experiments that the larvae normally crawl but a few inches. Such spread, however, is comparatively insignificant except in the case of nursery stock, which is grown close together. It is possible that strong winds may carry the young bodily from one tree to another, or they may be floated on water to distant points, particularly in irrigated districts, but the principal method of the spread of these young lice is by means of other insects and by birds. The active young lice soon crawl upon any small winged insect, particularly if the latter be of a dark colour, and may thus be carried considerable distances. They are frequently found crawling upon ants, which are great travellers. It is extremely probable that they also crawl upon the feet of birds, and may be transported by these carriers for many miles. . . .

"In spite of the abundance of insects which may transport the larvae the progress of the scale from infested trees to non-infested trees is slow where trees are moderately widely separated, and usually an entire orchard will not become affected from a single original point for several years. . . .

"The larva does not ordinarily travel far from the parent insect, and usually rests within a few inches of the old scale or at the first available point. They will not, so far as observed, travel very far from the base of the tree, and in the potted trees none were observed to go more than 2 inches from the base of the trunk."

Rooibloem.

(*A Preliminary Report on an investigation of the life history of the Rooibloem or Witchweed.*)

By H. H. W. PEARSON, Sc.D., F.L.S., Harry Bolus Professor of Botany in the South African College.

1. This investigation was commenced in March, 1911. Observations have been made on Mr. Weir's farm at Koedoospoort, near Pretoria, and on the farms of Mr. Tidboald and Major Doyle on the Springbok Flats.

2. It is quite clear that when the Rooibloem has once established a connection with the plant at whose expense it lives, it cannot be eradicated without injury to the host. Therefore it is necessary that the conditions of the germination of the Rooibloem seed should be thoroughly investigated in the hope that some method of attacking it after the seed has germinated and before the seedling attacks the host plant, may be devised.

3. Experiments on the germination of seed collected in 1911 have met with very limited success. A few have germinated, but not enough for the purposes of experiment.

4. While the life-history of the Rooibloem itself has not until this year been investigated, the life-histories of several parasites of the same family (e.g. the Louse-wort, Eyebright, the Yellow Rattle, the Cow Wheat, the Tooth-wort, etc.), are fairly completely known. These plants are so closely related to the Rooibloem that it may safely be assumed that characters which are common to them all will be found to be possessed also by the Rooibloem. One of these general characters is that the seeds will not germinate until they have passed some months in the soil (i.e. in general, a winter season). There can be little doubt that the Rooibloem seeds behave in the same way, and hence the failure to secure a good proportion of germination in any of the very varied sets of conditions that have been tried. The few that have germinated were either some of a very small number gathered in 1910 (Springbok flats), or were precocious seeds of the present year.

5. The conditions of germination cannot therefore be thoroughly investigated until next summer. Seeds, for the purpose of these experiments, are now buried in an area which Mr. Weir has kindly allowed me to enclose on his farm.

6. There are also other characters which the investigations of Dr. Heinricher and others have established for the genera related to the Rooibloem, which will almost certainly be found to apply also to the Rooibloem. Some of these have an important bearing upon the problem of the Rooibloem disease of the mealie. It is therefore imperative that certain preventive measures should be taken during the coming season, before the germination experiments can be completed.

7. In the genera closely related to the Rooibloem it is found that

(*a*) The seeds live in the soil, for many years—ten, fifteen, or more;

(*b*) the seeds which fall to the ground in one year do not all germinate in the next year but their germination is spread over

a number of years. For example, of the seeds scattered in 1911, some will germinate in 1912, more in 1913, others in 1914, and so on. It follows therefore that the seeds which fall in 1911 will infect the ground *for many years.*

Now, the structure of the seed is of such a nature that without doubt, it will prove quite impossible to kill it before it begins to germinate. Therefore, even if there may eventually be found some means of destroying the young seedlings, or of preventing them from attacking the mealie, these means will have to be used year by year for many years before the land is freed from Rooibloem. And even then, a few plants, allowed to set seed unnoticed, would renew the infection.

8. Each Rooibloem plant allowed to flower and fruit sets more than a thousand seed. The number of seeds that will be set in a mealie field badly infected by Rooibloem is therefore enormous. And it must be remembered that *one year's seeding infects the land for mealie crops for many years to come.*

9. It may be repeated that these facts have not yet been established for the Rooibloem, but any one who has studied the group to which it belongs cannot doubt that they will be found to be as true for the Rooibloem as they are for the other root parasites related to it.

10. This conclusion accords with certain facts that are well known to farmers. For example, a rotation of crops has been tried as a remedy, but without success. After an interval of one, two, or more years, during which no Rooibloem, or very little, has been seen, a mealie crop is as badly affected as before. Some seeds undoubtedly germinate in each of the years intervening between the two mealie crops but, except where they are able to establish themselves on some grass or other chance host, they die before reaching maturity; the soil, however, still contains ungerminated seeds by which future mealie crops are infected.

Cases have been described in which veld, newly broken up and planted with mealies, shows Rooibloem in the first year, becoming more abundant in the second and third years if mealies are continuously planted. It is not difficult to account for this, at least partially, on the grounds stated above. The seeds of the Rooibloem are not only very numerous, they are also very small and very light. The fruit opens in such a way that the seeds can be easily caught up by the wind and carried for long distances. Those which fall on the veld will be ready for years to come to infect mealies that may be planted there. If only one of such seeds germinates and gives rise to a Rooibloem plant on a mealie, its offspring, multiplying vigorously at the expense of the mealie crop, establishes a new centre from which the seed may be further scattered.

11. It is clear from these considerations that *the Rooibloem must be prevented from setting seed.*

12. Observations made at the end of the last mealie season appear to show that for some weeks the Rooibloem exists underground, the only sign of its presence being the exhaustion of the mealie plant. At length its stems appear above ground, flower, and set seed. To prevent the setting of seed, the Rooibloem must be uprooted *not later than the very early stage of flowering.* This may be done by hand or, at least to a large extent, by a plough or broad hoe run up between the rows. The latter method is to be recommended. The Rooibloem plant is attached to the mealie root by very delicate and brittle connections. The disturbance of the soil caused by the plough will, to a greater or less extent, break the connections between the underground shoots of the Rooibloem and the mealie roots,

and so be of some benefit to the present mealie crop. But when the plough is used, plants which it does not reach must be pulled by hand.

13. These measures, to be effective, must be adopted wherever the Rooibloem shows itself. Neglect on one farm renders fruitless the efforts to get rid of the pest on another in the vicinity.

14. It has been thought by some that if left to itself the Rooibloem will in a few years become "played out" and will eventually disappear. There are no indications that such an event is likely to occur and it would be most unwise to attach any importance to the suggestion. On the contrary, it is rather to be feared that the spread of the Rooibloem and the damage for which it is responsible are increasing year by year. There are also signs that it is adapting itself to other hosts among which are at least two important field crops.

The Production of Bright Tobacco in the Transvaal by the Flue-Curing Process.

By H. W. Taylor, B.Agr., Officer in Charge, Government Tobacco and Cotton Experiment Farm, Rustenburg.

Tobacco cultivation in the Transvaal is a subject which is at present receiving much attention from both the farming population and the general public. The increase in production from 2,891,450 lb. to 5,346,430 lb.* between 30th June, 1909, and 30th June, 1910, attests the fact that the farmers are alive to the importance of this crop.

Although the crop shows a notable increase, the report of the Department of Commerce and Industries, for the half-year ended 30th June, points out the fact that the imports of tobacco for the half-year were £150,000 greater than for the corresponding period of last year, while the exports of South African tobacco decreased £3000. This would seem to indicate that the local demand for tobacco is increasing faster than the supply.

The local grown tobacco which commands the highest price is what is known as yellow or bright leaf, suitable for cigarettes. The demand for this class of tobacco is in excess of the supply and hence fancy prices are paid the grower for this type of leaf. Up to the present time tobacco has been cured in the Transvaal by what is known as the air-curing process, or by natural climatic agencies and without the use of artificial heat. When climatic conditions are favourable some excellent "yellow leaf" is produced; but when very damp weather prevails for a week or ten days after the tobacco is harvested, and more especially after the tobacco has "yellowed", even the tobacco grown on the most suitable soils will cure a red or dark colour more often than yellow. On the other hand, if severely dry and windy weather is experienced immediately after harvesting, the tobacco will dry out too rapidly and much of the green colour will remain in the leaf, thereby decreasing its value. In other words, the farmer who follows the air-curing process in the Transvaal, and attempts to produce yellow leaf, is more or less at the mercy of the elements.

Experiments at the Government Tobacco and Cotton Experiment Farm, Rustenburg, have proved conclusively that yellow tobacco can be successfully cured in the Transvaal by means of artificial heat, by what is known as the "flue-curing process". Many progressive farmers have made inquiries regarding this process of curing yellow tobacco, and it is the purpose of the writer to give the essential details of this method of curing tobacco, of which little is known in the Transvaal.

History.—The process of "flue-curing" tobacco had its origin in the State of North Carolina, in the United States of America, about sixty years ago. Two brothers, Eli and Elisha Slade, were the first

* Vol. I, No. 2, *Agricultural Journal of the Union of South Africa.*

to cure tobacco by artificial heat, regulated in a definite manner. These men grew tobacco on very light, sandy soil and, by using charcoal fires, succeeded in curing their tobacco a beautiful lemon yellow colour. Their neighbours soon began to use the same method and secured the same results. Improvements in the process were made and the charcoal fires were soon superseded by a furnace and flues (see ground plan) by which means the temperature is more easily controlled. The industry was only well established when the Civil War broke out in the States, and between 1860 and 1870 very little flue-cured tobacco was produced. However, the industry was revived about 1870 and the cultivation of yellow tobacco spread rapidly. On account of its beautiful colour and pleasing odour and flavour the leaf commanded a high price. Its cultivation soon spread into South Carolina, Virginia, Kentucky and Tennessee; and in these States hundreds of flue-barns were built. This type of tobacco has become so popular that the demand for it is very great, and from its humble beginning this process of curing yellow leaf has spread beyond the confines of the "yellow tobacco district" in the United States of America, and flue-barns are now also found in Asia and Africa.

In Africa flue-curing tobacco is successfully practised by the farmers in Rhodesia and Nyassaland and parts of the Cape Province, and we hope that in the near future the farmers of the Transvaal will realize the importance of this method and place this Province in such a position that it will continue to produce the best tobacco in South Africa.

Advantage of the Process.—The advantages of the process are numerous; in the first place, a higher percentage of yellow tobacco can be obtained, and this grade commands the highest price on the market; then flue-cured tobacco has a more pleasing odour and flavour than air-cured tobacco, hence the same grade will command a higher price when flue-cured; by using artificial heat in a tight shed the tobacco is not subject to much climatic changes after harvesting; then in a dry climate, such as we have in the Transvaal, the tobacco which is harvested in March or April and placed in the ordinary air-curing shed must hang until the rains of the following season before it can be marketed. Being thus exposed to the severe winds considerable loss occurs, and, in addition, the farmer must wait several months for the money from that portion of his crop. When the tobacco is cured in a flue-barn it can be moistened and taken down at any time by a process which will be explained later; and lastly, more tobacco can be cured in a "flue-barn" in one season than in a barn of any other type which costs the same amount of money.

The Flue-shed.—Flue-curing sheds are built small. The best size is 16 feet square, inside measurements, by 20 feet high. Farmers often ask why the sheds are built so small. The reason is that the shed must be filled in one day, and a barn of the above dimensions can be readily filled in the required time by the labour found on the average farm. Again, tobacco cures a more uniform colour in a small shed than in a large one and less fuel is required.

The flue-shed should be built in a sheltered place so that the temperature is not influenced by strong winds. A south-east hillside, with plenty of large bush to break the force of the wind, is an excellent location for this district, because of the north and north-west winds during the curing season. When erecting a shed on the hillside the door and furnace should be on the lower side of the slope.

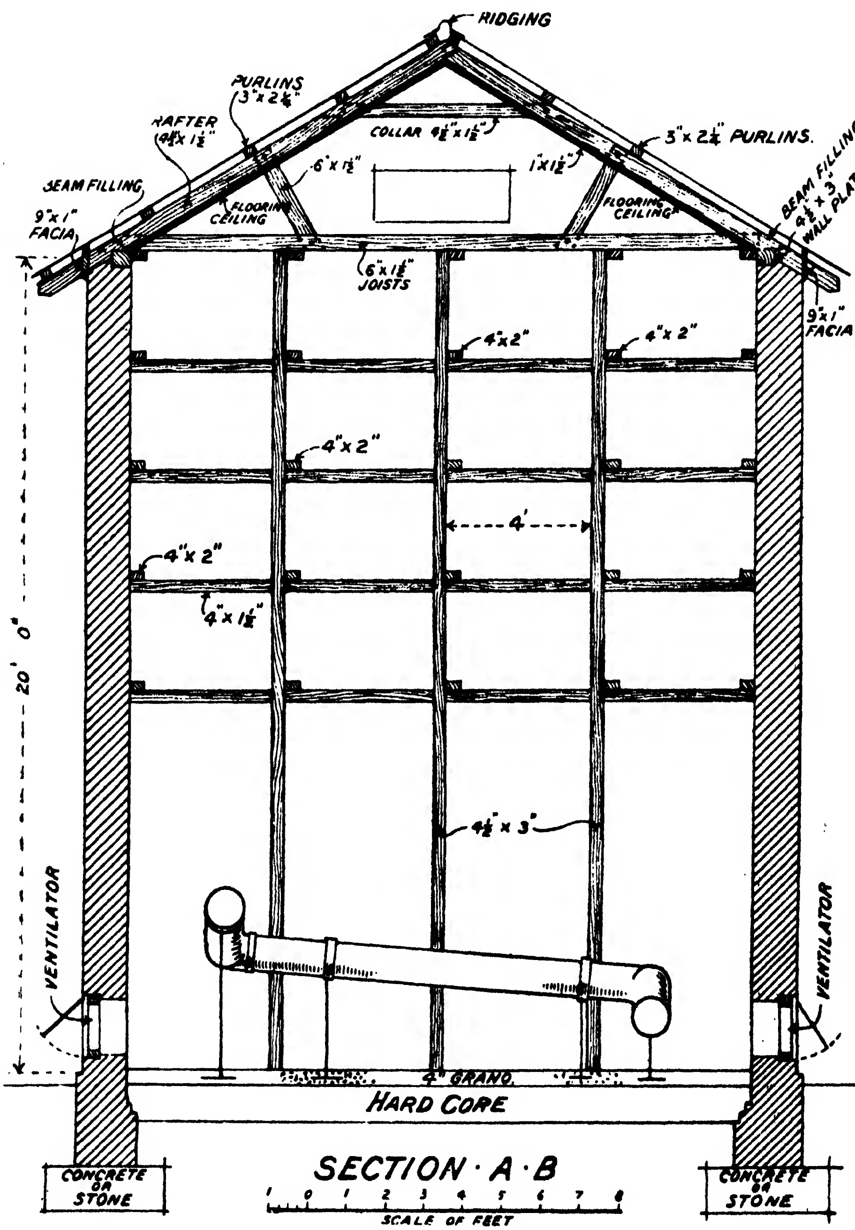
A shed of the above dimensions should be divided into four rooms, each of which should contain five tiers, thus making twenty tiers in the shed, each 16 feet long, and capable of holding 480 laths filled with tobacco. Each lath should carry on an average seven plants, making the capacity of the shed 3360 plants, or in other words, the shed will hold as much tobacco as can be grown on one-half to two-thirds of an acre. Each shed can be filled three times each month, so that 10,080 plants can be cured in each shed per month.

The width of a curing shed should always be some number of feet which is divisible by four, since the tier poles, upon which are placed the laths carrying the tobacco plants or leaves, are placed 4 feet apart. A "tier" then is the horizontal space between two tier poles or deals, and a "room" is the vertical space included between two sets of tier poles extending from bottom to top. A shed 16 feet square inside and 20 feet high may be described as a four-room five-tier shed.

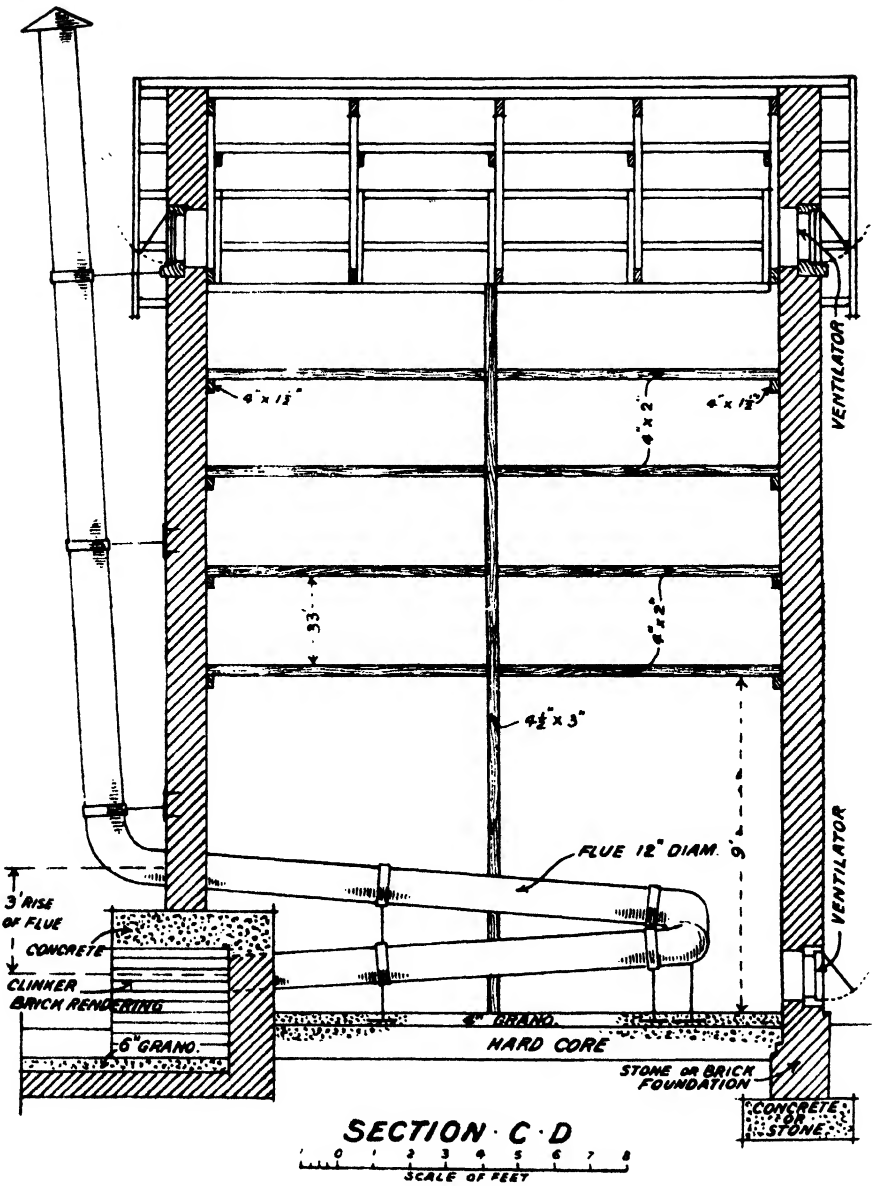
The first set of tiers is placed 9 feet from the floor. This height is necessary to prevent the leaves in the lower tiers from being injured by high temperatures. The remaining tiers are placed 2 feet 9 inches apart vertically (see section CD of plan). All tiers are placed 4 feet apart horizontally (see section AB of plan).

The tier poles are made of 2 inches by 4 inches deals or of round poplar poles. The three inside sets of tier poles are supported in the middle by 3 in. by 4½ in. deals or by large poplar poles. The ends of the tier poles are supported by 1½ in. by 4½ in. deals secured to the end walls or are built into the walls. The outside sets of tier poles are supported by being attached to the walls (see section AB of plan). The walls are built of brick and are 14 inches, or one and one-half brick, in thickness. The outer course of brick should be burned while the inner course may be constructed from ordinary sun-dried brick. Near the ground, on three sides, two ventilators 12 in. by 18 in. should be placed in each wall (ground plan). Also a ventilator, 18 in. by 42 in., should be placed in each end of the shed (section CD of plan) above the top tier. All of these ventilators should be so constructed that, when closed, very little air will enter the shed and no moisture escape. The door should be made in two parts (elevation plan) and as small as convenient, and should also be tight fitting. The roof principals should be made of 1½ in. by 4½ in. material (section AB of plan). The roof is made of corrugated iron and ceiled with flooring boards to make it as nearly air-tight as possible. The furnace should be 5 feet long, 2 feet 6 inches wide, and 2 feet 9 inches high, inside dimensions. Only about 18 inches of the furnace should project outside the walls. It should be well arched, and unless fire-bricks are used in its construction the arch should have some support. Old wagon tyres make excellent supports. The flue (section ground plan) should be 12 inches in diameter. The first 8 or 9 feet should be made of ⅛-inch material to withstand the high temperature and the remainder of the material can be of 22-inch gauge. The flue extends around the inside of the shed about 2 feet from the wall, and the point at which it passes out of the wall should be about 3 feet higher than the point at which it is set into the furnace (section CD of plan). The mouth of the flue should be about 2 feet above the floor of the furnace to prevent the draught from being affected by charcoal forming a bank in front of the flue-pipe. It is advisable to have the flue-pipe extended above the roof (section CD of plan)

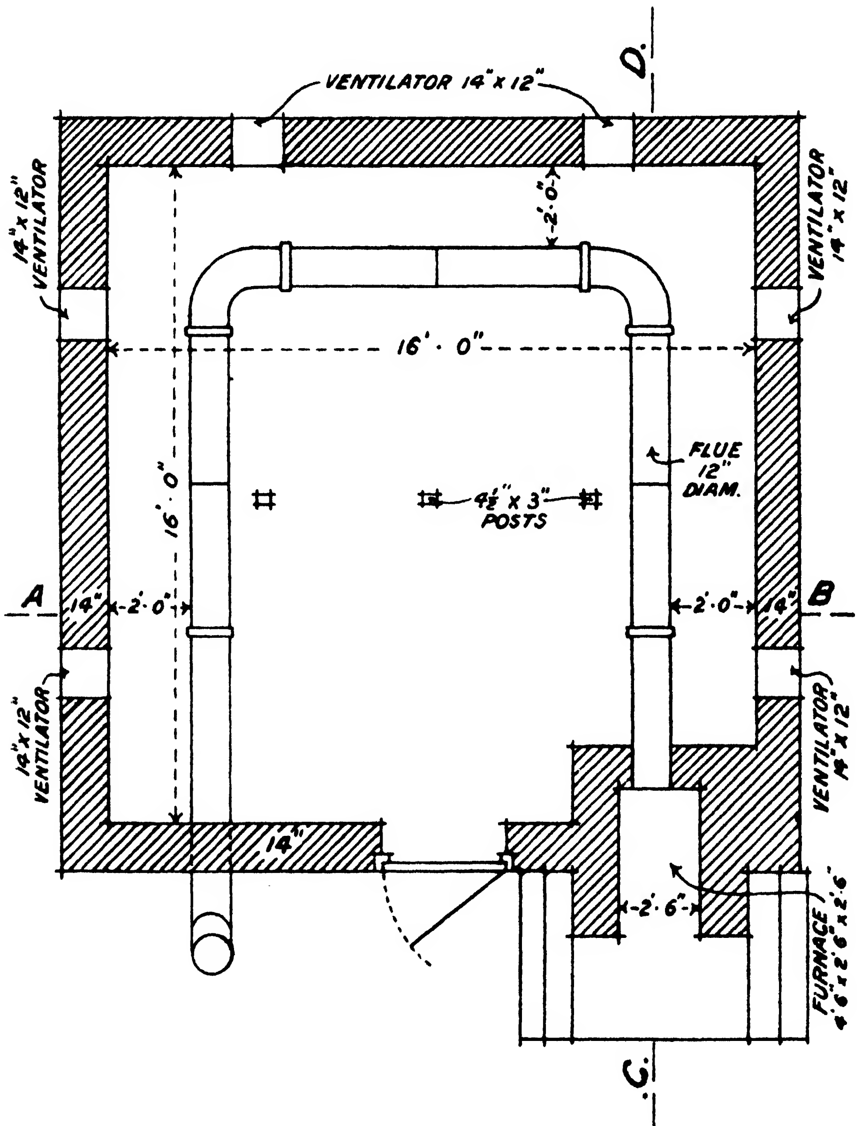
Flue-Curing Process for Bright Tobaccos.



Flue-Curing Process for Bright Tobaccos.



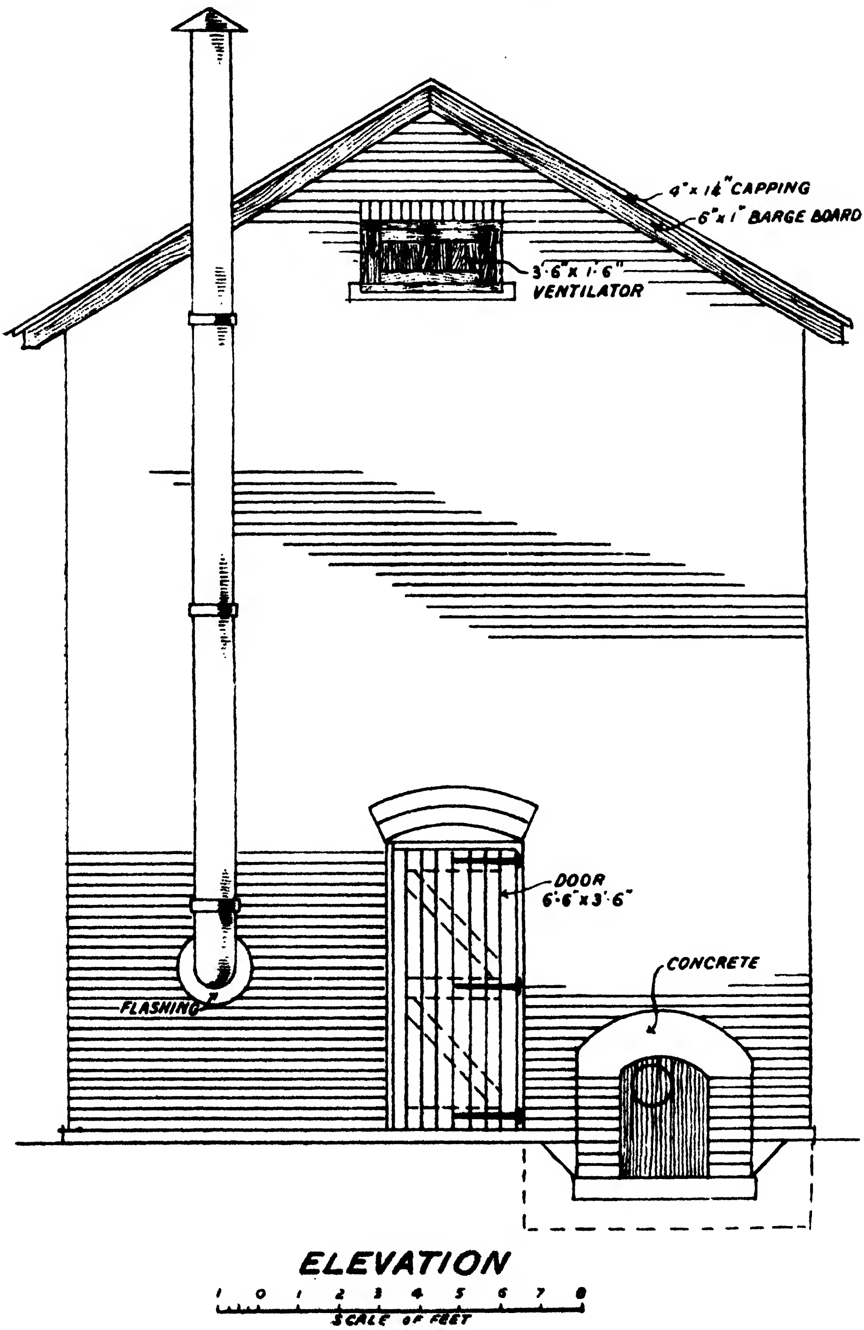
Flue-Curing Process for Bright Tobaccos.



PLAN

SCALE OF FEET

Flue-Curing Process for Bright Tobaccos.



so that the draught will remain constant whatever the direction of the wind.

Where cheap construction is desired the cost of erection can be reduced to a very low figure. The only material which it is necessary to purchase is that used in the roof, doors, ventilators, and flues. Straight poplar poles can be used for the tiers and the brick can be made on the farm. The total cost should not exceed seventy-five pounds, including material and erection.

Varieties to Grow.—The varieties which have given the best yellow leaf, flue-cured, are "Yellow Pryor" (see plate 2), "Bullion" (see plate 3), "Hester", "Blue Pryor", and "Boyd 1269". "Gooch" and "Sterling" have not given satisfactory results. Some excellent leaf has been obtained from "White Burley", but it requires very careful curing to prevent the leaf from "sponging" or turning red.

Seed Selection.—Seed selection is a point of prime importance to the grower, especially one who flue-cures his tobacco. Tobacco can not be successfully flue-cured unless it takes on a greenish yellow colour in the field. Plants of a dark green colour are apt to prove disappointing and should be avoided. If the grower intends to produce yellow leaf he should save for seed only those plants which show a decided tendency to yellow on the land. These plants should be bagged with a 12-lb. paper bag to prevent cross-fertilization. In preparing the plant for reception of the paper bag all of the top leaves and sucker branches up to the "crow foot" should be broken off, leaving only three or four top branches to form seed; and only about sixteen to eighteen leaves on the stalk. The bag should then be inverted over the flower head and tied loosely with a soft string. The plant should be bagged before any of the flowers open, and should any have opened before the bag is applied they should be pruned off. When a majority of the pods have formed, say 70 to 80, the bag may be removed and the remainder of the flowers and buds pinched off. After removing the bag the plants should be visited weekly to remove any flowers or buds which may have formed.

The seed head should not be severed from the stalk until the pods are brown. When the pods are brown the seed head should be taken off and hung in a dry place, where mice and birds can not get to them, for two or three weeks, after which the seed should be shelled out, carefully labelled, and placed in a safe dry place. Before sowing, the seed should be passed through a tobacco seed grader (plate 4) to separate the light from the heavy seed. Both experimental and practical results have shown that tobacco grown from properly graded seed is more uniform as to size and colour and that the yield per acre is larger. Although these machines are not expensive it is not expected that every farmer will own one. However, the Tobacco and Cotton Division of the Department of Agriculture is prepared to grade tobacco seed for farmers and return it free of charge.

Seed Beds.—Too much care cannot be exercised in the preparation and management of the seed beds. The best soil for seed beds is a light sandy loam and the spot selected should be well protected. The soil should be first treated with a liberal application of well pulverized kraal manure and then dug over to the depth of an ordinary spade. The soil should then be finely pulverized with a hand rake and covered with sufficient brush to burn the soil to a depth of 4 to 5 inches. Experiments conducted during the past two years have proven that the open fire method of sterilizing gives the best results. After

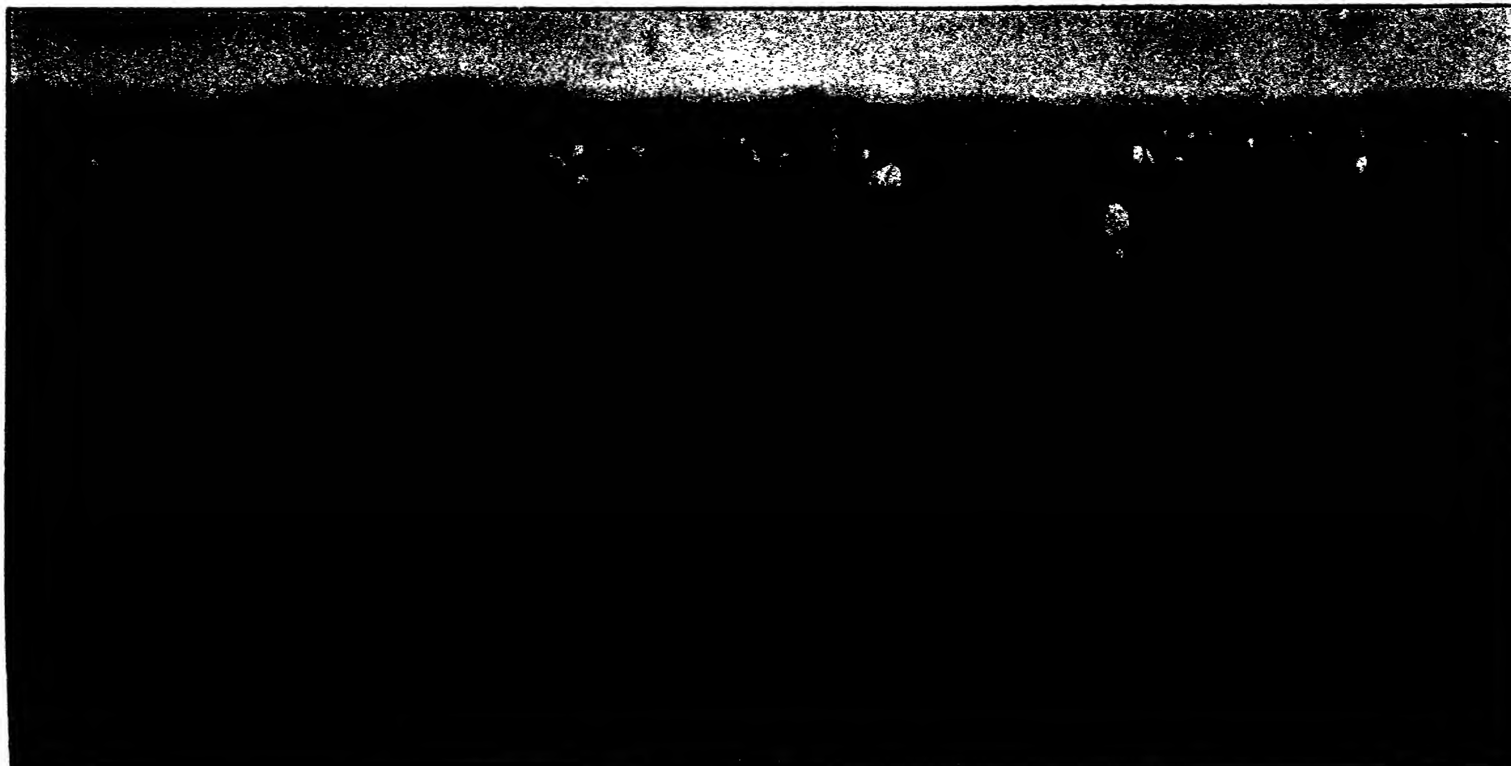


Plate II. *Photo by H. W. Taylor.*

Field of Yellow Pryor. Government Tobacco and Cotton Experiment Station, Rustenburg.

Production of Bright Tobacco.

Plate III.

Photo by H. W. Taylor.

Field of Bullion. Government Tobacco and Cotton Experiment Station, Rustenburg.

burning, rake off all unburned pieces of wood and redig the soil to the depth of 3 inches, turning under all ashes. Finely pulverize the soil a second time and sow the seed at the rate of one ounce of seed to 120 square yards of seed bed. A very convenient size for seed beds is 3 feet by 25 feet. On a bed this size half of a teaspoonful of tobacco seed should be sown. In order to secure an even distribution the latter quantity of seed should be thoroughly mixed with about one quart of fine wood ashes or mealie meal. Wood ashes are preferable. After sowing sift enough clean sand over the bed to cover the ashes or mealie meal lightly and then water with a sprinkling can. *Seed beds should not be watered by irrigation.* After sowing the seed beds should be covered with grass mats to hasten germination and to protect the young seedlings. When the plants are well up they should be exposed to the sun for a short time in the morning and afternoon. The period of exposure should be gradually increased until the young plants are hardened sufficiently to stand the hot sun, then protection is no longer required.

Suitable Soils.—The soils found in the Transvaal which are best suited to the production of yellow leaf are turf, sandy turf, and sandy soil, light in both colour and texture. Not all turf soils are suitable for the production of yellow leaf. The turf soil which shows an admixture of white, calcareous gravel, and is underlain with the same, has given on the Experiment Farm, Rustenburg, and in this vicinity, excellent yellow tobacco. On such soil the tobacco does not grow large but yellows well on the land. Soil of this description should have a medium slope and be provided with surface drainage to prevent the tobacco from being drowned during periods of excessive rainfall. Sandy turf also produces good bright tobacco, but the writer has not seen such soils in any considerable areas. Very light sandy soils produce good yellow leaf with judicious fertilizing or manuring.

Preparation of the Soil.—The soil should be thoroughly prepared before the tobacco is transplanted into the field. It should be borne in mind that proper preparation of the soil, before the tobacco is transplanted, saves considerable intertillage and ensures the young plant a good start, which, in tobacco cultivation, is half the battle. When possible the land should be ploughed in the fall and fallowed during the winter. This helps to rid the field of insect pests and makes the soil more friable. The soil should then be reploughed in the spring and harrowed until the soil is thoroughly pulverized. Whenever the ploughing is done the soil should be ploughed deep and thorough. Deep ploughing enables the roots of the plants to penetrate deeper and brings into use a larger amount of plant food, besides forming a reservoir for storing moisture.

Transplanting.—When the plants are about 6 inches in height they are ready for transplanting. For producing yellow tobacco the rows should be placed 3 feet apart and the plants placed at intervals of 2 feet in the rows.

The field should, when possible, be aligned due east and west. This allows the sun to shine down between the rows of tobacco during the whole period of growth and, by keeping the surface of the soil dry at the base of the plants, helps to prevent "white rush" and other diseases. In transplanting care should be taken to place the roots of the plants straight in the soil. When the roots are placed in the soil in a crumpled mass the plant is apt to make a very poor growth. If the roots of the plants are unusually long they should be

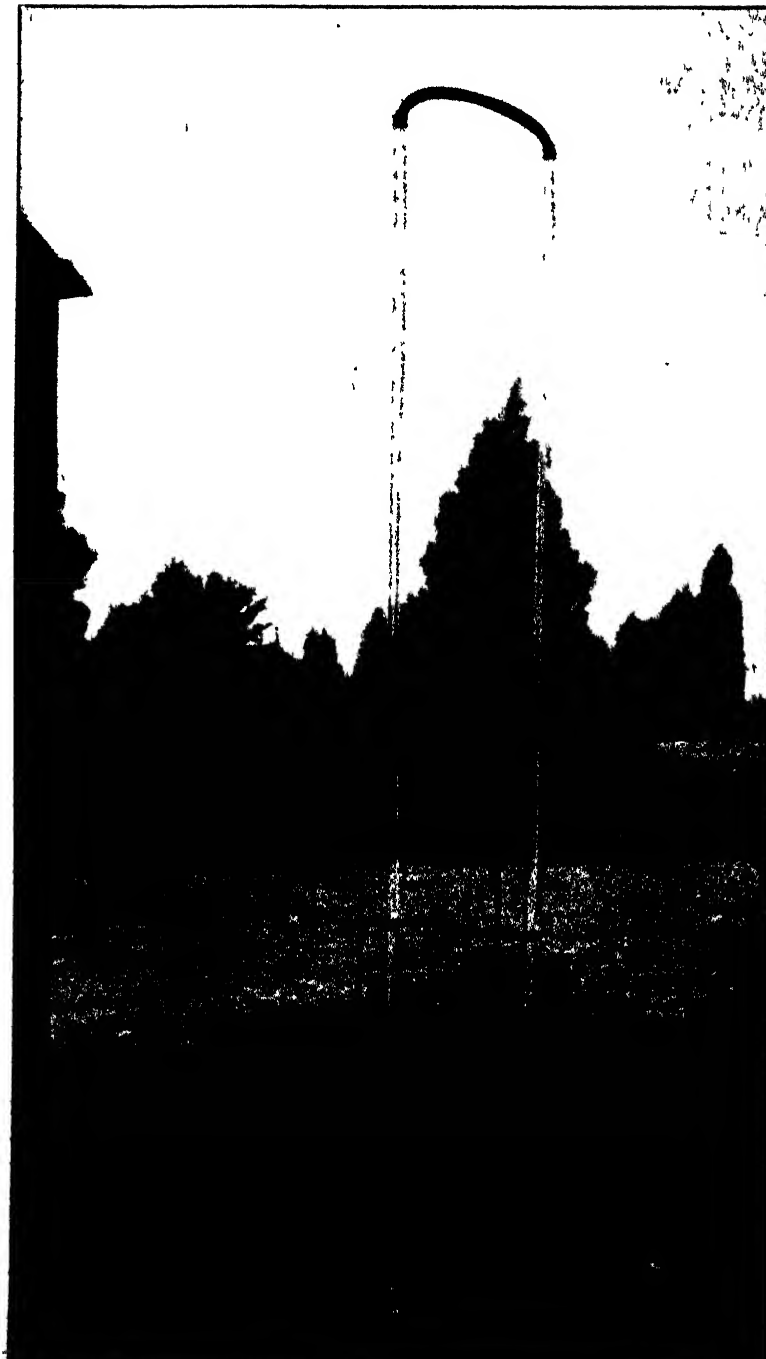


Plate IV. *Photo by Mr. T. A. J. Place.*

Tobacco Seed Separator.

pruned back from 2 to 2½ inches in length in order to ensure them being properly placed in the soil. Transplanting is best done with a wooden pin about 2 inches in diameter and 10 inches long. The pin must of course be sharpened at one end. The hole for inserting the plant should be made just deep enough to receive the roots of the plant and sufficient of the stem to bring the bud leaves to the surface of the soil. After inserting the plant gently firm the soil around the roots. Tobacco growers differ as to the best time during the day for transplanting. When the grower has water for irrigation it is the writer's opinion that transplanting can be done during the whole day. When water is scarce and the plants are watered by hand the best time to transplant is in the latter part of the afternoon.

Cultivation.—As soon as the plants are established cultivation should begin. The soil should be ploughed deep before transplanting and cultivated shallow afterwards to conserve moisture and keep down noxious weeds. No fixed rule can be laid down as to the number of times tobacco should be cultivated. In seasons of light rainfall more cultivation is required than in seasons of heavy rainfall and vice versa. The best indications that cultivation is necessary are the formation of a hard crust on the surface of the soil and the presence of young weeds. The former indication, and often both, can be noted after a rain or after the field has been irrigated. When the tobacco becomes so large that the implement injures the leaves cultivation should be discontinued.

Topping.—Tobacco for flue-curing should be topped low. No rule can be given for the exact number of leaves to be left on each plant. Strong growing plants will mature more leaves than weaker ones. However, it is a safe practice to top the plant to from twelve to sixteen leaves. From observations made in the field the writer does not hesitate to say that a majority of farmers in the Transvaal top their tobacco too high. This practice is to be discouraged. The top leaves remain small and do not ripen at the same time as do the middle ones, and when harvested, as a rule, cure dark; thus the grower has a large number of inferior leaves to handle on account of improper topping. Topping tobacco too high adds labour in handling, lowers the grade of the leaf, and means a loss in money to the grower. For flue-curing, especially if the grower wishes to cure the whole plant, it is essential that the tobacco be topped low so that all of the leaves will be of the same ripeness when harvested. If the leaves are not all of the same ripeness when put in the barn the tobacco will not cure uniformily and hence will not command the best price.

Harvesting.—There are two methods of harvesting tobacco, viz., the whole plant and the single leaf. When the former is practised the stalk of the plant is split by a single downward stroke with a tobacco knife to within about 4 inches of the ground. The stalk is then severed near the ground with a sloping cut (plate 5). The plant is then placed astride a lath, which will carry from seven to ten plants, depending on their size (plate 6). The laths carrying the tobacco are hung on the trolley (plate 7) and carted to the flue-barn. This method has the advantage of being rapid and requiring less labour than the single-leaf system. The disadvantages are that a lower percentage of yellow leaf is obtained and more fuel (wood) is required in the curing. A special trolley or frame should also be provided to prevent bruising the leaf. In the single-leaf method the leaves are primed from the stalk while standing in the field and carried to the

Plate V.

Photo by H. W. Taylor.

Cutting Tobacco. Government Tobacco and Cotton Experiment Station, Rustenburg.

Production of Bright Tobacco.

Plate VI. *Photo by H. W. Taylor.*

Lath filled with Tobacco. Government Tobacco and Cotton Experiment Station, Rustenburg.

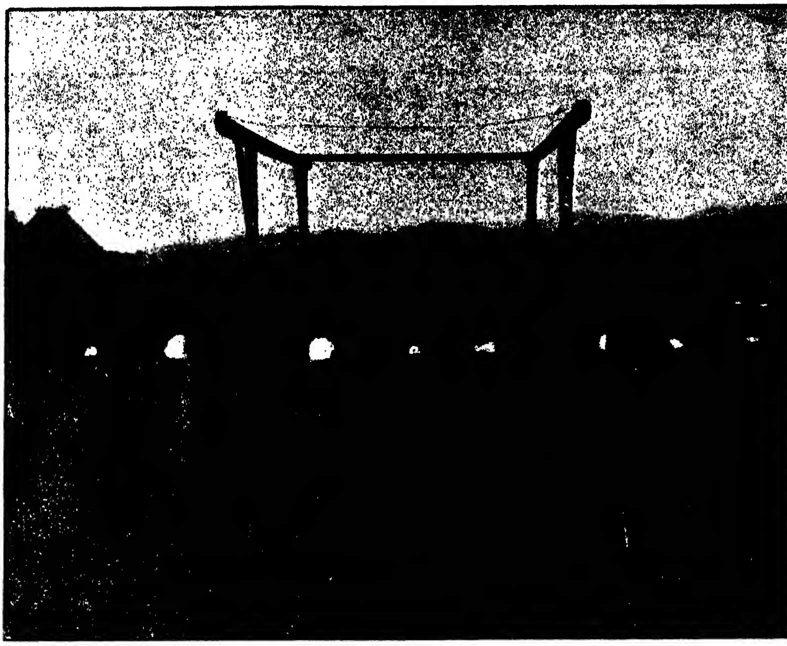


Plate VII. *Photo by H. W. Taylor.*
Tobacco Trolly. Government Tobacco and Cotton Experiment Station, Rustenburg.

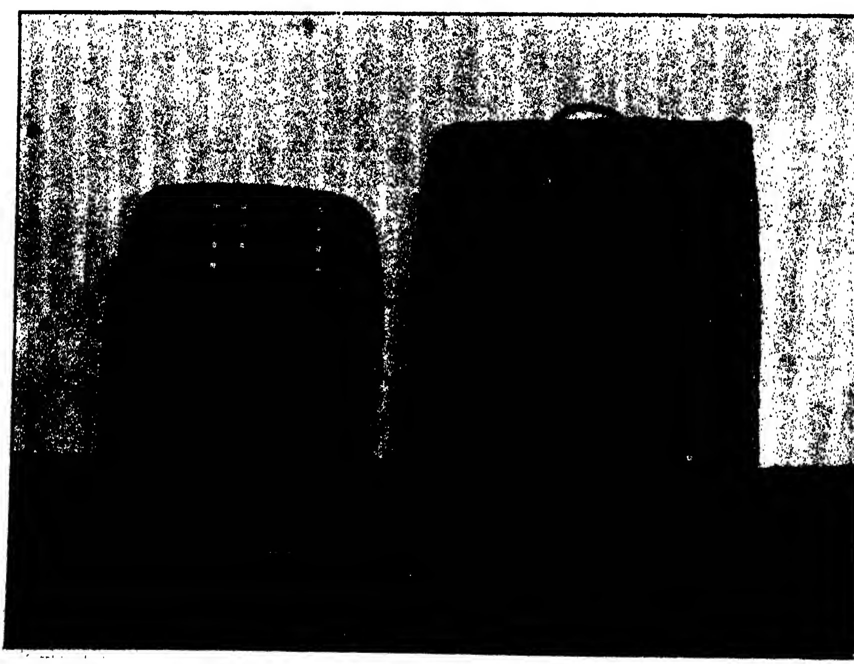


Plate VIII. ***Photo by H. W. Taylor.***
Baskets for carrying Tobacco Leaves from Field to Curing Shed. Government Tobacco and Cotton Experiment Station, Rustenburg.

flue-shed in baskets (plate 8). The leaves are then strung on wires about 9 inches long, which are placed across the laths at right angles and secured with wire netting staples. Six to seven wires can be attached to each lath (plate 9), and each wire will carry from eight to twelve leaves, depending on their size. The first leaves to be harvested are, naturally, the lower ones since they mature first, then the middle leaves, and finally the top leaves, so that three pickings are necessary to harvest the whole of the leaves. This method requires more labour in harvesting, but less fuel is required in the curing and a higher percentage of yellow leaf is obtained. Another advantage, and an important one, in harvesting by the single-leaf system is that the bottom leaves can be picked when in proper stage of ripeness, thus preventing waste, which must occur if the grower waits for the middle and top leaves to reach the proper stage of maturity for harvesting the whole plant. Again, harvesting can be commenced earlier where the single-leaf method is practised and thus finished earlier. From experience the writer does not hesitate to recommend the single-leaf system where sufficient labour can be obtained. It must be remembered that to flue-cure tobacco the leaf must be thoroughly ripe. Immature leaf will not yellow properly in a " flue-barn " and the cured product will be of an inferior quality. The plant should be left in the field until the leaf takes on a greenish yellow colour. The nearer the leaf approaches a yellow colour in the field the better colour it will cure. As flue-curing is only making a beginning in the Transvaal it is well to again warn growers that a large rank growing leaf of a dark green colour will not cure yellow in a " flue-barn ". If this fact is remembered it may be the means of preventing many disappointing failures. When ripe the leaf, as a whole, should have a yellowish green colour, while numerous flecks of a lighter tint are noticeable as spots on the leaf. To obtain the best colour in curing the tobacco must be harvested at just the right stage of ripeness, which requires some experience and good judgment.

The Flue-curing Process.—The use of artificial heat, distributed by means of flue-pipes throughout the curing process, is a distinctive feature of the flue-curing method. The colour of the cured product determines its value, and the colour most desired is a bright lemon yellow. This colour is principally dependent upon two factors, the soil and proper management during curing.

No fixed and absolute formula can be given for the management of a flue-shed since difference in climatic conditions, varieties of tobacco, and character of the soil, all affect the rate of curing and manner of handling the operation. The formula which will cure a shed satisfactorily one week may, on account of climatic changes, have to be slightly altered the following week. Different varieties of tobacco require different periods of time to yellow and different temparatures to fix the colour in the leaf, so that any formula is at best empirical. The grower must use his own judgment and apply the remedy to suit the case. We can, however, give some general directions which it is necessary to follow at all times.

In flue-curing there are four stages through which the tobacco must pass, viz., the yellowing stage, fixing the colour, killing the leaf, and drying the midrib and stalk.

The shed should be filled in one day so that all of the tobacco will yellow at about the same time. As a rule the tobacco in the lower tiers will yellow first and will also be the first to dry out. As soon

Plate IX. *Photo by H. W. Taylor.*
Laths for hanging Leaves in Flue Shed. On left, filled lath ; on right, unfilled.
Government Tobacco and Cotton Experiment Station, Rustenburg.

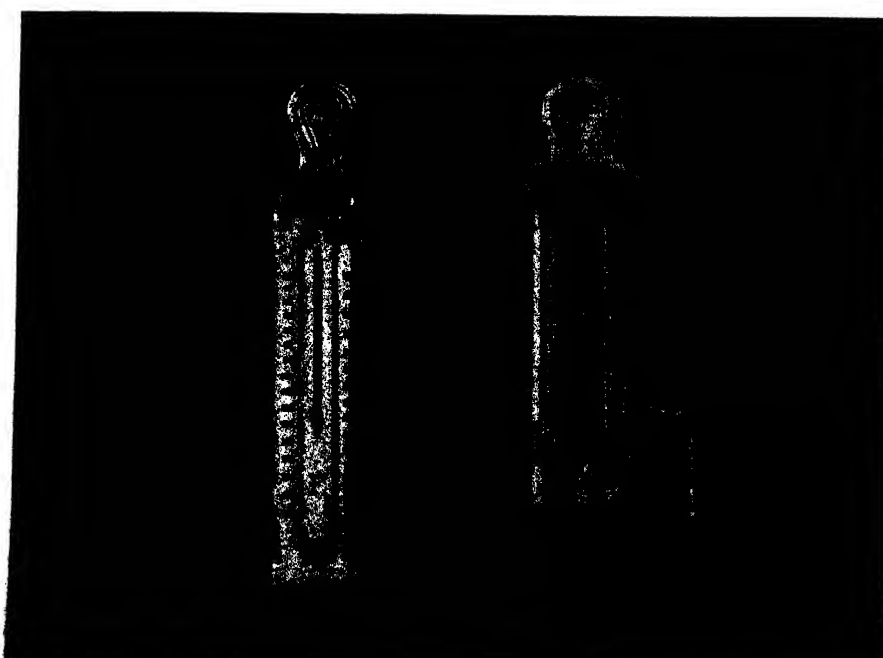


Plate X. *Photo by H. W. Taylor.*
Thermometer on left, Hygrometer on right.

as the shed is filled the shed should be tightly closed, to prevent the escape of moisture, and a small fire started in the furnace. A thermometer and hygrometer (plate 10) should be placed in the centre of the barn on a level with the lower tier of tobacco. Both of these instruments can be purchased at a first-class chemist shop and are indispensable. The hygrometer is used to indicate the amount of moisture in the room and is a necessity for the proper manipulation of the shed. Only moderate fires are maintained in the beginning, but are gradually increased until the temperature in the shed reaches 90° F. This temperature is maintained for about ten hours and then slowly increased to 100° F., at which time the tobacco should be starting to yellow. When the tobacco begins to yellow rapidly the temperature should be increased to 110° F. and held at that point until the tobacco is thoroughly yellow. The yellowing process may require any length of time from twenty-four to thirty-six hours and even forty-eight hours. During the yellowing stage plenty of moisture must be kept in the shed to prevent the leaf from drying prematurely. This is when the hygrometer is invaluable. Enough moisture must be kept in the shed during this stage so that the depression of the wet bulb will never be more than 3 or 4 degrees below the dry bulb. If a depression of 3 degrees could be maintained the tobacco would yellow more rapidly and more uniformly. Should the wet bulb show a depression of more than 4 degrees artificial moisture must be introduced into the shed. This can be done by wetting the walls below the tobacco, by pouring water over the floor, by suspending vessels full of water over the flue-pipes and allowing the water to drip on the pipes to be converted into vapour, or by placing wet bags on the flue-pipes.

When the tobacco is properly yellowed the next step is to prevent further change in colour or to fix the yellow colour in the leaf. This is the critical period and requires the closest attention. If the atmosphere of the shed is too humid, or if the ventilation is not sufficient and the temperature is not increased fast enough, moisture will collect on the surface of the leaf and the tobacco will turn a reddish brown colour or "sponge", which decreases the value of the leaf. On the other hand, if too much ventilation is given and the temperature is increased too rapidly, the leaf will be killed too quickly, and a greenish red or black colour will develop, which destroys the value of the tobacco. The proper conditions are maintained when the shed is so ventilated that the moisture is carried off as fast as it comes to the surface of the leaf, and the temperature regulated so that the colour will be fixed in fifteen to eighteen hours. To do this the bottom and top ventilators must be slightly opened as soon as the tobacco is yellow and the temperature raised gradually from 110° to 115° F. The temperature should then be kept at 115° F. for about six hours and slowly increased to 120° F. and kept at that temperature until the leaf begins to dry; then advance the temperature to 125° F. and hold the temperature at that point until the leaf is practically dry. By that time the colour should be fixed.

To thoroughly dry the leaf and midrib the temperature is increased to 130° F. in two hours and held at that point for six hours, and then increased to 135° F. and held for another six hours. The temperature is then run up to 140° F. and held at that point for another six hours, when the leaf and midrib should be dry. The ventilators are then closed and the temperature increased 5° per hour

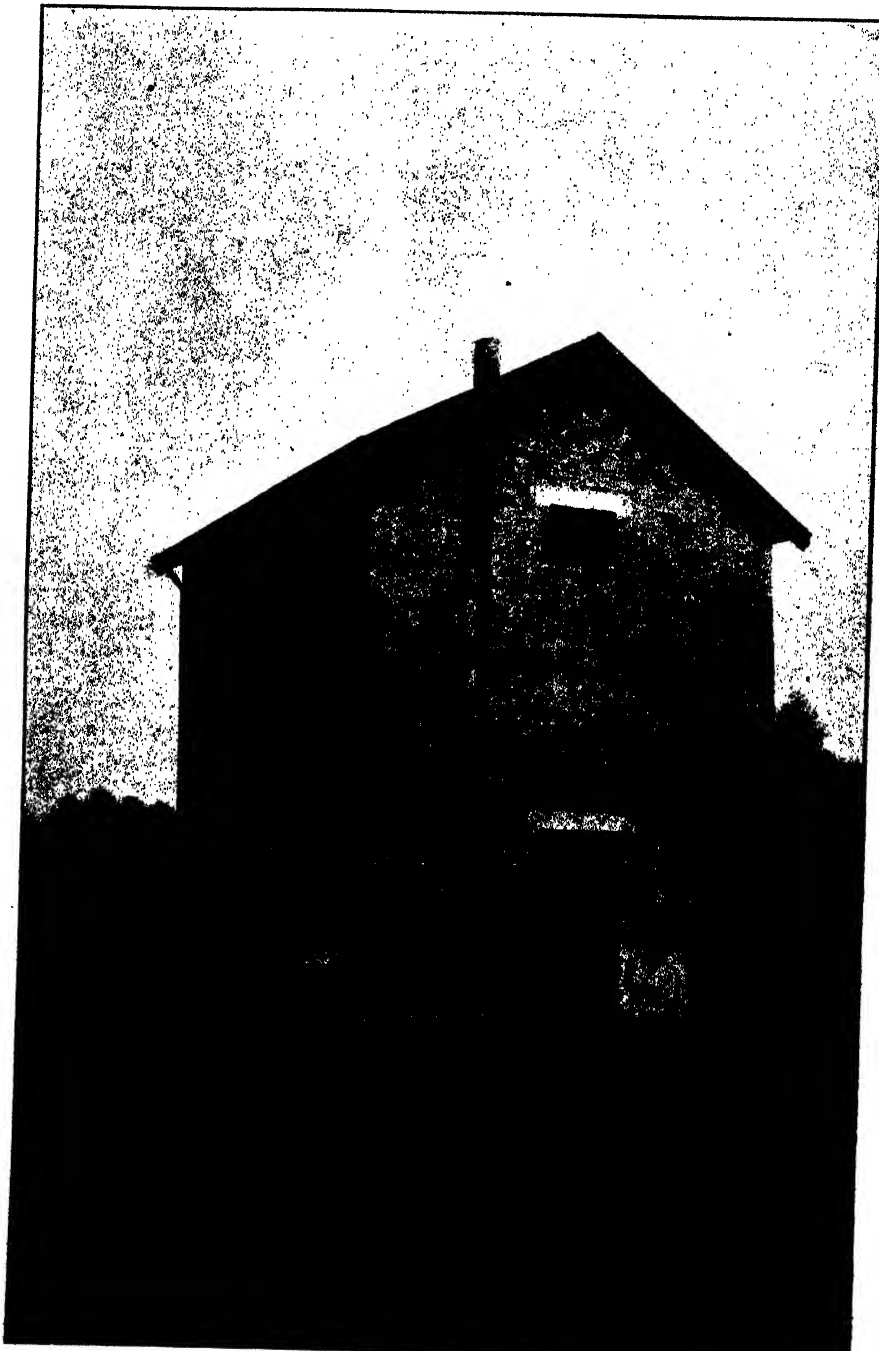


Plate XI. *Photo by H. W. Taylor.*

Flue-Curing Shed, showing Boiler in rear. Government Tobacco and Cotton Experiment Station, Rustenburg.

to 160°, and held for eight to ten hours or until the stalk is thoroughly dry. When once started the fires must be kept going day and night until the curing is finished. From four to five days are required to cure a shed of tobacco. It must be remembered that the above temperatures are given merely as a guide and that each grower must use his own judgment and adapt the temperature to suit the conditions.

Below are given a record of temperatures which were used to cure a very successful shed, but it was necessary to slightly modify them several times during the season on account of climatic conditions. Since the rate of curing is influenced considerably by the temperature of the outside atmosphere, which replaces the air in the curing shed when ventilating, it will be found that higher temperatures are required in wet weather than in dry weather and that lower temperatures are required in cool weather than in warm.

RECORD OF TEMPERATURES.

Date.	Hour.	Thermometer.		Hygrometer.		Student on Duty.	Remarks.
		Max.	Min.	Dry Bulb.	Wet. Bulb.		
		°	°	°	°		
21/3/11	6 p.m.	71	68	70	66	D. J. v. d. Merwe	Fire first started.
	7 ,,	71	69	71	70	,,	Clear and calm.
	8 ,,	73	70	73	71	,,	,,
	9 ,,	74	73	74	73	,,	,,
	10 ,,	76	74	76	74	,,	,,
	11 ,,	78	76	78	77	,,	,,
	12 ,,	79	77	79	77	,,	,,
22/3/11	1 a.m.	79	78	80	77	C. H. S. v. d. Merwe	Clear, light breeze.
	2 ,,	80	79	80	77	,,	Clear and calm.
	3 ,,	80	79	80	78	,,	,,
	4 ,,	82	80	82	79	,,	,,
	5 ,,	84	82	85	81	,,	,,
	6 ,,	85	84	85	81	,,	,,
	7 ,,	85	84	85	81	D. D. Brown.....	,,
	8 ,,	87	84	87	83	,, ...	,,
	9 ,,	90	85	90	83	,, ...	Began to introduce moisture into barn.
	10 ,,	91	86	91	86	,, ...	Clear, and light breeze.
	11 ,,	91	87	90	89	,, ...	,,
	12 noon.	91	86	92	90	A. J. v. Leeuwen.	Clouds appearing, light wind.
	1 p.m.	93	90	93	90	,, .	Cloudy and windy.
	2 ,,	93	91	93	90	,, .	,,
	3 ,,	93	92	94	91	,, .	,,
	4 ,,	94	93	95	93	,, .	Cloudy and light wind.
	5 ,,	94	93	95	93	,, .	,,
	6 ,,	96	94	97	95	,, .	Clearing up.
	7 ,,	97	95	97	95	J. Cochrane.......	Clear, light wind.
	8 ,,	98	95	98	96	,, ...	,,
	9 ,,	98	96	98	95	,, ...	,,
	10 ,,	98	96	99	95	,, ...	Cloudy and windy.
	11 ,,	98	96	99	95	,, ...	,,
	12 ,,	99	98	100	96	,, ...	Cloudy and calm.
23/3/11	1 a.m.	99	96	100	96	J. v. d. Merwe....	Clear and calm.
	2 ,,	100	98	101	98	,, ...	,,
	3 ,,	101	98	102	99	,, ...	,,
	4 ,,	102	99	104	99	,, ...	Cloudy and calm.
	5 ,,	104	100	105	100	,, ...	,,
	6 ,,	105	102	106	101	,, ...	Tobacco almost yellow.

Record of Temperatures—(*continued*).

Date.	Hour.	Thermometer. Max.	Thermometer. Min.	Hygrometer. Dry Bulb.	Hygrometer. Wet Bulb.	Student on Duty.	Remarks.
		°	°	°	°		
23/3/11	7 a.m.	106	103	106	101	C. H. v. d. Merwe	Cloudy and calm.
	8 „	107	104	108	103	„	„
	9 „	110	107	110	105	„	„
	10 „	115	109	115	108	„	„
	11 „	115	110	115	104	„	Moisture discontinued, tobacco yellow.
	12 noon.	118	115	119	105	„	Cloudy and calm.
	1 p.m.	120	118	120	106	A. J. v. Leeuwen.	„
	2 „	120	118	121	108	„	„
	3 „	122	119	123	109	„	„
	4 „	124	122	124	109	„	„
	5 „	125	124	125	108	„	Began ventilating.
	6 „	125	124	Discontinued Hygrometer.		D. D. Brown.....	Clearing up.
	7 „	125	123			„	Clear and calm.
	8 „	125	124			„	„
	9 „	126	125			„	„
	10 „	125	122	—		„	Clear and windy.
	11 „	124	122	—		„	„
	12 „	126	124	—		„	„
24/3/11	1 a.m.	126	124	—		J. Cochrane.......	Cloudy and windy.
	2 „	126	125	—		„	„
	3 „	127	125	—		„	Cloudy and light wind.
	4 „	128	126	—		„	Cloudy and calm.
	5 „	130	128	—		„	„
	6 „	130	129	—		„	„
	7 „	131	130	—		D. J. Brown......	Clear and calm.
	8 „	132	130	—		D. J. v. d. Merwe	Windy and cloudy.
	9 „	133	131	—		„	„
	10 „	133	131	—		„	Windy, clearing up.
	11 „	135	133	—		„	Breezy and clear.
	12 noon.	135	133	—		„	Calm and clear.
	1 p.m.	135	133	—		C. H. S. v. d. Merwe	„
	2 „	139	135	—		„	Bottom ventilators closed.
	3 „	139	136	—		„	Calm and clear.
	4 „	140	136	—		„	„
	5 „	140	138	—		„	„
	6 „	140	138	—		„	„
	7 „	142	139	—		A. J. van Leeuwen.	„
	8 „	144	140	—		„	„
	9 „	146	144	—		„	„
	10 „	149	147	—		„	„
	11 „	149	147	—		„	„
	12 „	149	147	—		„	Bottom ventilators closed.
25/3/11	1 a.m.	153	149	—		D. D. Brown.....	Calm and clear.
	2 „	155	152	—		„	Top ventilators closed.
	3 „	160	154	—		„	Calm and clear.
	4 „	160	159	—		„	„
	5 „	160	159	—		„	„
	6 „	160	159	—		„	„
	7 „	162	160	—		J. Cochrane.......	„
	8 „	162	161	—		„	„
	9 „	162	160	—		„	„
	10 „	165	162	—		„	„
	11 „	165	162	—		„	„
	12 noon.	160	155	—		„	„

Management after Curing.—After the curing is finished the fires are drawn and the shed allowed to cool off. After cooling sufficiently close the ventilators and sprinkle the floor, and walls of the shed below the tobacco, with water. These should be kept well moistened for one day, and then a small fire started in the furnace and wet bags placed on the flue-pipes to form vapour for softening the leaf sufficiently for taking down. If the grower has a portable boiler (plate 11) steam can be generated much more rapidly and with less labour. When the midrib is moist enough to bend without breaking the tobacco can be taken down, graded, and tied into " hands " (bundles) of about twelve to fifteen leaves each. In tieing the leaves into hands care should be taken to place only leaves of the same colour and length in the same hand. Torn and damaged leaves should be placed in a grade to themselves. To properly sort tobacco into the several grades requires extra labour, but there is no operation connected with tobacco cultivation which so handsomely rewards the grower.

After sorting the leaf the several grades should be baled separately. For bailing tobacco should be just moist enough to prevent breakage. When baled with too much moisture in it there is danger of yellow tobacco undergoing fermentation, which gives it a dark colour and thereby decreases its value. If baled in the proper condition the colour will improve and present a better appearance to the buyer and hence will realize a higher price.

Acknowledgments.

The drawings of the Flue-curing Shed used in this article were executed by the Public Works Department.

Killebrew & Myrick's " Tobacco Leaf " was referred to regarding the history of the flue-curing process.

A System of Marking and Recording Pedigree Stock.

By Alex. Holm, General Manager, Experimental Farm, Potchefstroom.

In the breeding and management of pedigree stock, it is important that a correct and complete system of tracing the pedigree of each animal be adopted, and at the same time a system whereby each animal can be identified by its owner without trusting entirely to memory. This article will deal chiefly with the marking and recording for the purposes of a private herd or flock book. The larger question which concerns the marking of stock for identification purposes by a Stud Book Association is one which presents great difficulties, and it is very doubtful whether a satisfactory system applicable to all kinds of stock in South Africa can be devised. But each breeder of pedigree stock should possess a complete and simple system of marking and recording his own stock. Recognising that a great many breeders have some difficulty in keeping the pedigree records of their herds and flocks, some good purpose may be served by explaining the system which is adopted in connection with the several herds and flocks at the Government Experimental Farm, Potchefstroom. Experience has proved it to be a simple, convenient, and correct system. Before explaining it, it is advisable to make a few remarks upon other systems of marking for identification purposes.

(1) *Branding on the Skin.*—This would undoubtedly be an effectual method, but it is doubtful whether breeders of pedigree stock would adopt it on account of the disfiguration of the animals which is caused by it.

(2) *Branding on horns and feet.*—Branding on the horns is part of the system which will be explained later, but it is necessary to have some system of marking animals without horns, and calves before they grow horns. The objections to "foot" branding are that in calves the horn is too soft, in sheep and goats it is too small, and in all cases it is often difficult to read numbers on the foot. Among "polled" cattle it cannot well be avoided, but only in this instance is branding on the foot recommended.

(3) *Ear tags, ribbons, rivets or studs.*—In South African conditions, with its wire fences and scrub, this system is generally unsatisfactory. A large proportion of the tags, ribbons, rivets, or studs get torn out of the ear, and the ear is often disfigured. Only among ostriches and among stock almost constantly stabled does this system appear to be satisfactory in South Africa.

(4) *Tattooing.*—Among white-eared sheep, goats, and pigs, tattooing appears to be satisfactory up to a certain point, but it possesses the following disadvantages. The animal has always to be caught and held before the marks or numbers can be deciphered; in many instances the markings are read with difficulty and uncertainty, and in some cases are illegible. Among cattle the system of tattooing is entirely unsatisfactory and impracticable.

Horses are successfully tattooed on the inside of the lower lip, but in ordinary cases there does not appear to be any great necessity for special identification marks to be made. In the first place, "pedigree" horses are not as a rule bred in considerable numbers on South African holdings, and, in the second place, it will in almost all

cases be found possible to identify such horses by keeping a careful record of colour markings.

The system adopted among the several herds of cattle and pigs, and among the flocks of sheep and goats at the Potchefstroom Farm depends upon the use of a code of ear marks for all stock, and for cattle the addition of horn brands, as will be explained hereunder.

The code of ear marks is given in the following diagrams:—

Care should be taken to use markers of suitable size, otherwise the ears may be unnecessarily disfigured. For cattle and pigs the "Henry Boker 28", and for sheep and goats, a smaller marker of the same kind, are recommended.

With this code any number from 1 to 99 can be made on the ear, and with a little practice the numbers can be rapidly determined. It will be observed that units are always found on the left ear, and "tens" on the right ear.

To take a few examples in order to demonstrate the use of the code:

Suppose the number to be 14, there would be one cut on the top of right ear = 10, and two cuts in the left ear, one on the top middle = 1, and the other on the bottom middle = 3. 10 + 1 + 3 = 14; or take another number, 97, there would be three cuts on right ear, one on point = 50, one on top = 10, one on bottom middle = 30. This marking on the right ear gives 50 + 10 + 30 = 90, and the unit 7 is obtained on the left ear, with one cut in the bottom corner.

Hundreds can be marked by punching a hole in the middle of left ear; 200 by doing the same in the right ear. Other hundreds can be made as required in several ways which will occur to the user.

Calves, lambs, and pigs, which suckle their dams, should be marked in this way before they are weaned. Calves which are hand reared should be marked when they are a week or two old. In this system of ear-marking the number of an animal can generally be determined without catching the animal, though in the case of cattle it is also desirable to brand them on the horn. The horn numbers are more quickly seen, and especially when cattle are running loose the horn numbers are an advantage.

Horned cattle should be branded on the horn with the corresponding number on the ear. It will be found convenient to brand cattle when they are about two years old or about the time when they begin breeding. The horn will then be sufficiently well grown to take the brand.

The horn should be branded on the inside with a brand at least

three-quarter inches long. It will be found that the brand will not wear out so soon on the inside as on the outside of the horn.

"Polled" cattle may be numbered on the hoof at the same age as other cattle are branded on the horn.

In starting the numbering of a herd or flock, begin at unity with both males and females, and follow on the numbering of each in consecutive order according to the date of birth of the animal. In this way the comparative ages of the different animals are approximately indicated, i.e. the higher the number the younger will be the animal. In the case of animals to whom names are also given, the numbers referred to above should appear after the name in the herd book.

In regard to the records of pedigree stock, every breeder should keep a private register or herd book, in which is entered the pedigree of each animal, all information concerning its progeny, and many other items of interest and value. A breeder who depends upon odd notes made in a notebook, or promiscuous entries made in several odd books, not only gives himself additional work but endless trouble in tracing the records accurately when they are required. Probably the most simple, yet complete, register which the breeder can use is that published by Messrs. John Thornton & Co., Princes Street, Hanover Square, London, W., in their No. 1 Private Herd Book for Pedigree Stock. It only costs about half a guinea, and every breeder should have one for each pure breed of stock in his possession.

A page of this book for cattle is reproduced herein. For sheep, goats, and pigs the columns can be slightly altered by the breeder himself.

At the end of the book are several pages for recording the full pedigrees and particulars of the sires used.

It will be seen that on each double page is found a complete record of the dam and her progeny. The female progeny retained in the herd are entered as "dams" when they commence breeding. The system is the simplest possible demanding the minimum number of entries, and is a check for correctness within itself.

Many breeders will be desirous of giving their animals names, and will probably prefer to adopt a system of naming by families. In that case the progeny should be named as follows:—

Assuming that the original "family" dam is "Duchess", her daughters would be successively "Duchess II", "Duchess III", and so on. There are, however, many systems of naming pedigree stock, and each breeder should follow his own fancy in this matter.

There is one point to which attention may profitably be directed. Each breeder should adopt a prefix or suffix in naming his stock, and he should preferably choose the name of his farm, district, or town. In this way it will at once be known by breeders that all animals with a certain prefix or suffix were bred by the breeder possessing that prefix or suffix. To give an example, suppose the name of the breeder's farm to be Grootvlei, then the stock bred by him might be named, in the case of prefix, "Grootvlei General", "Grootvlei Louis", "Grootvlei Fancy", "Grootvlei Milkmaid", or, in the case of a suffix, "General of Grootvlei", "Louis of Grootvlei", "Fancy of Grootvlei", "Milkmaid of Grootvlei", and so on.

The Stud Book Association will, it is hoped, make arrangements for the registration of such prefixes and suffixes, so that no two breeders can use the same prefix or suffix for the same breed of stock.

Name of Animal.................................... H.B. Vol.......p.......

Give distinctive **markings**. Colour............

Month. Day.

Breeder......................... Calved.....................19...

Herd Book No.

sire.......................

dam......................... Vol.......p.....by.......................

gr.d.......................... Vol.... . p.....by.............. ....

g.gr.d.......................... by.......................

by.......................

How obtained..

Number of calves had when bought..................... ....

Prizes won: Give Date and Place of Show and Number in Catalogue.........

....

How disposed of.................. ....

Remarks..

PRODUCE.

Date when cow was served. Month. Year.	By what bull.	H.B. No.	Date when cow calved. Month. Year.	Colour of calf. Distinctive marks.	Sex of calf. B. or C.	Name of calf.	Days, weeks, or months in milk.	Total yield with each calf.

Calves sold..

Prizes won by calves................. . ...

Remarks.. ....

....

....

....

A Plea for the Adoption of Milk Records in South Africa.

By Thomas R. D. Carruthers, Dairy Inspector (Cape).

Introductory Note by E. O. Challis, Acting Superintendent of Dairying.

The following article on milk records should prove of great interest to all progressive farmers and stock-breeders.

Mr. Carruthers has had considerable experience in Scotland in establishing milk records, therefore he can speak with authority on the utility and benefits to be derived by same. I am glad to say that farmers all over South Africa are paying more attention every year to the keeping of milk records, and it is the intention of the Division of Dairying to give every assistance to help on the development of this important work.

I have frequently drawn stock-breeders' attention to the fact that not only must the quantity of milk be increased but the quality must be studied also. This applies more particularly to the popular Friesland breed, and it is only by establishing milk records, followed by breeding on proper lines, that quality and quantity can simultaneously improve. This has been accomplished in America and elsewhere, and I feel sure can be accomplished here if tackled intelligently and in the right way.

Breeders of pure-bred stock who keep milk records can always sell their young stock to better advantage than those who keep no records, likewise the farmer who goes in for a utility dairy herd can cull out the animals that do not pay to keep.

I trust the appended article will stimulate additional interest and lead to the general adoption of milk records in South Africa.

By the phrase "Milk Records" is meant the weighing and testing of each cow's milk, so that a farmer can ascertain how much milk his cows are giving, how much butter fat is in the malk, and whether his cows are returning a profit on what money is laid out on them in the shape of food and labour.

In European countries the keeping of milk records has been carried on by individual farmers for the last twenty-five years, but this article is not so much a plea for each farmer keeping his own milk records as for a number of farmers co-operating and having their cows' milk weighed and tested by an expert who is a neutral party, the method of which will be explained later.

The arguments in favour of milk records are based on the fact that "like produces like", and so it stands to reason that a cow which is a deep milker will produce a female calf which in its turn will prove to be a good milker, provided, of course, that the sire of the calf is from a deep milking strain, and likewise a calf from poor milking parents will give a comparatively small yield of milk. To breed for milk, which is to say, to rear heifers which will, if possible, outstrip their mothers in the amount of milk yielded, it is essential to mate with the cows a bull whose parents were first-class milkers. Unless this is done, very disappointing results will fall to the lot of the breeder.

It is quite a common practice for farmers to mate with deep milking cows a bull who is beautiful to look at, but nothing is known of the milking qualities of his dam and grand-dam. An example of this may be given. Mr. Marshall, of Riding Mill, England, seven years ago purchased a bull calf from a grand pedigree cow in one of the milk classes at the London Dairy Show. The sire of this calf was a pedigree bull. He served several of his cows with this bull up to the time when he was two and a half years old, when he was sold to go to the Argentine. His offspring when they calved were all beautiful animals, but very poor milkers. Seeing how the offspring of this bull turned out, Mr. Marshall made inquiries about the sire, and found that he was off a family which had been bred for generations for beef instead of for milk, and that his prepotency in that direction was greater than that of the dam in the production of milk. The result here, as in many other cases, is that the bull is spoiled for getting stock able to produce milk, and that the heifers from him are in a great part failures as far as milk production is concerned.

Another case may be quoted, which shows the value of making sure that the sire is from a dam which has a high percentage of fat as well as a good quantity of milk, because a farmer must not only try to grade up the quantity of milk given by his cows but also the quality. A farmer in Holland had six heifers, which had the following percentages of fat in their milk, viz., 2.77, 3.02, 2.71, 2.62, 2.96, and 2.54. The dams of all these heifers are in the herd-book, and in the whole herd there are only two cows which have had under 3 per cent. of fat. The sire of the heifers is, however, out of a cow which yielded milk with an average of only 2.39 per cent. of fat. The influence here is as strong in the wrong direction as in the case of Mr. Kuperus, another Dutch farmer, who, by selecting his bulls from cows giving milk of a high quality, raised in nine years the percentage of fat in the milk from his herd from 3.15 to 3.52; no easy task, when it is a well-known fact that milk from Friesland cows is very poor in butter fat when compared with other breeds of cattle.

Before milk records were introduced in the various countries it was the usual custom, and is even now, for dairy farmers to judge a cow for milking purposes by appearance alone. While this in many cases has proved correct, yet many disappointments have resulted, and the experience has been dearly bought. The writer knows of two herds of Ayrshires in Scotland, one of which by the keeping of milk records the yield per cow was brought up to 900 gallons in a lactation period of forty-two weeks. This, at 6¾d. per gallon, which was the amount obtained for the milk, equals £25. 6s. 3d. per cow. In the other case the farmer bought cows which had been known to have done well in the showyard, and the bulls were selected on appearance only. These cows yielded only 400 gallons in forty-four weeks. This at 6¾d. equals £12. 7s. 6d., a difference of £12. 18s. 9d. between the two herds, and both cost practically the same to feed, viz., 11d. and 11¼d. per cow per day during the winter months.

In a recent report of the Dairy and Cold Storage Commissioners in Canada, it was said that some farmers had, by keeping milk records, increased the yield of their cows from 13 to 60 per cent. The Milk Record Society of Vallakra may be quoted as an example of how, by continued selection and breeding, the quantity and quality of milk may be increased. During the first year of the existence of the above society, the average percentage of butter fat in the milk was 3.09, while in its sixth year the average had increased to 3.21 per cent. of

fat, notwithstanding that the quantity of the milk was 31 per cent. greater than it had been six years previously. Some may say that this is all very well, but that in their opinion a moderate milking cow may be just as profitable as a heavy milking one, as, in addition to the extra food consumed, the depreciation on the cow is likely to be greater. Such is not the case, and a good milking cow will give more milk than a bad one, while both are getting the same food, and if she does depreciate yet she has paid for any loss in that direction, because she may be kept till she is seventeen or eighteen years old, giving a large yield of milk all the time, and producing progeny which have turned out first-class milkers and excellent milk record bulls. Any farmer will tell you where there are cows which are all getting the same food yet there are some which give more milk than others. Although food is essential, yet it is not everything in the production of milk. There are always bad cows in a herd, and these must be got rid of, as they are not worth keeping, and the surest way of getting rid of these, and of keeping and breeding from the best, is by milk records.

For the farmer the keeping of milk records on a co-operative basis will give excellent results, and in certain ways is better than each dairyman weighing and testing the milk himself, because he may not have the time to spend on it, and it is done by an impartial party who, at the same time, has learned the art of finding out the percentage of fat in milk by a chemical process. Again, the fact that the cows have been tested by a neutral party will have much more weight when the farmer is selling a milk record cow or bull. Certainly, if there be no such thing as a co-operative milk record society, then the farmer should weigh and test the milk himself, or if he does not know how to test it, he can always weigh, and excellent results will be obtained. The first co-operative milk record society was started at Vejon, in Denmark. Their average per cow for the first two years was 670 gallons; the average for the eighth year being 730 gallons, an increase of sixty gallons per cow all round. This at 8d. per gallon would be an increase of 40s. per cow. Some of the herds had a much greater increase than that, one in eight years rising from 477 gallons to 880 gallons; another from 574 gallons to 836 gallons, and a third from 617 to 867 gallons. These three herds had, therefore, an average increase of 265 gallons per cow in eight years. A farmer in Sweden, who prided himself on his good milking herd, joined one of these record associations, and his cows had an average of 800 each. He sold off forty-two of his worst milking cows and kept twenty-eight of his best, with which he mated a bull out of a well-known deep milking cow. Eight years later he had 72 cows, all descended from the twenty-eight selected animals, which gave an average of 1220 gallons per year.

Enough has now been said to show what milk records may do to grade up a dairy herd, and it may not be out of place to give a short description of how a milk record society is managed in other countries. In Denmark, which, for its size, has probably more societies than any other country, twelve or thirteen farmers will join together and form a "Control Society". An expert is employed, and he is supplied with the necessary outfit, which consists of a Gerber milk-testing machine, sampling bottles, a weighing bucket, and scale. An expert is generally a student, and generally a farmer's son, who has just completed his course at an agricultural college, where he has been taught how to test milk and enter the results up in a book. His salary may be about £25 a year, the farmer, at whatever place he is, giving him

his board and lodging. The expert arrives at the farm usually just before the mid-day milking, which he weighs, and takes a sample from every cow. This he does again in the evening and following morning, and after breakfast he tests the milk for the amount of butter fat. Each cow has a number, and the weight of milk along with the percentage of fat is entered in a sheet called the byre sheet, and is as follows:—

Name of Farm....................................
Owner...
Date of Visit......................................

Time of Milking { Midday............... Evening............... Morning...............

No. of Cow.	Lb. of Milk.			Total.	Per-centage of Fat.	Lb. of Milk of 1 per cent. Fat.	Remarks.
	Mid-day.	Even-ing.	Morn-ing.				
1	11	9½	14½	35	3·5	122·5	
2	20½	19	23	62½	3·6	225·0	
3	21	20	25	66	3·4	224·4	
Total	52½	48½	62½	163½	—	571·9	
Average	17·5	16·1	20·8	54·5	3·5	—	

In the remarks column may be put the feed of the cows at the time of the visit and the cost, and also any remark which may apply to any individual cow, such as "sick", etc.

A duplicate copy of this byre sheet is kept, and is very simply done by having two byre sheets pinned on to a board, between the two a piece of carbon paper is placed, and the entries made in a hard pencil. One of the sheets is left with the farmer, and the other carried on by the expert, who forwards it, along with the rest, to the controller of milk records for the district at the end of each round.

Before the expert leaves the farm the milk record book must be filled up. This book belongs to the farmer, and each cow has a page to itself, and it may be as follows:—

MILK RECORD: YEAR 191....

Cow's Name.. Cow's No.......... Age......years.
Breeder of Cow.................................... Sire of Cow.......................................
Date of last calving............................... Dam of Cow.......................................
Date when last served............................. Sex of Calf............ No. of Calf.........

Date from and to.	Lb. Milk for week.	Percentage of Fat.	Lb. of Milk of 1 per cent. Fat.	Remarks.
June 1 to June 8...	210	3·5	735·0	
„ 8 „ 15...	200	3·7	740·0	
„ 15 „ 22...	222	3·6	799·2	
„ 22 „ 29...	230	3·8	874·0	
Total				

Total for lactation period ... ... = ...gals.
Average percentage of butter fat ... ... = ...per cent.
Total lb. of milk of 1 per cent. butter fat ... = ...
Number of weeks in milk ... ... = ...weeks.

It will be noticed that both in the byre sheet and milk record book there is a column headed "lb. of milk of 1 per cent. fat", and this is obtained by multiplying the pounds of milk by the percentage of butter fat. The idea is to take into consideration the amount of milk given and the percentage of fat so that one cow may be compared with another. A cow may give a fair amount of milk, and yet have such a low percentage of fat that her milk is less valuable than that of her neighbours, which probably has not given such a high yield but is richer in fat.

In most Danish farms a board, called the "byre board", is hung up above the cow's head. The words may be painted on, but the figures are written in chalk, as some of them may have to be changed every week or so, as will be seen from the following example:—

No. of Cow: 36.

Date of last calving.................................1st March.
Date when last served...........................12th April.
Due to calf...12th January.
Total yield from 1st May to 8th May..............210 lb.
Percentage of butter fat..................................3·5.
Total yield to date.....................................1640 lb.

This board is for the edification of the dairy farmer, and is changed after the expert has made up the books. The farmer, the day the expert leaves, changes the figures, and the cattleman is able to see at a glance when the cow is due to calve, and consequently when she shall be put dry, how much milk she has given for the last seven days. This is essential, because on most Danish farms the cows are fed according to the amount of milk given. An example of the method employed in feeding according to the amount of milk produced may be cited. For the first 10 lb. of milk given, 1 lb. concentrated food is fed, and 1 lb. of food for every additional 5 lb. of milk. That is to say, that a cow yielding 30 lb. of milk per day receives 5 lb. of cake or some such food. If the yield is less than 10 lb., no concentrated food is allowed. In addition to this, regardless of the milk produced, 48 lb. roots, 14 lb. hay, and straw *ad lib.* is allowed; this food, of course, being necessary for keeping the cows in good condition.

The expert, when he has finished with one farm, moves on to the next one, and so on until he comes to the starting point. The round may take seven or fourteen days, according to the number of farms visited. When a cow is put dry the yield is added up and put at the foot of the page in the farm book, and a fresh page started when the cow comes in milk again.

In reckoning the cost of feeding the cow, it is usually done as follows: When the expert arrives at the farm he asks the farmer how much food he has given per cow per day since the last visit. Foods which were produced on the farm are valued, and those which were bought are taken at market prices. This is reckoned up, multiplied by 7 or 14, as the case may be, and put on one side. Then the expert ascertains how much the farmer has obtained for his milk, and the total written up on the other side. In the summer, when the cows are out at the grass, the value of the grazing per cow per day is estimated, and so at the end of the year the farmer is able to see whether each of his cows have left him a profit or not.

The question may be asked as to what is the use of ascertaining the percentage of the butter fat. This is of great value, because most milk in Denmark is sold according to the amount of butter fat in the milk, and thus, the richer the milk, the more money the farmer obtains for his produce, and this should be the practice all the world over.

Milk records have been carried on in Scotland for a considerable number of years now, and they have done a vast amount of good in bringing out the milking qualities of the Ayrshire cow. As the method is similar to that employed in Denmark nothing further need be said.

Naturally the above scheme could only be practised where the farms are situated close to each other. But if a farmer has not the opportunity of joining a co-operative society, and he is at all enterprising, he can easily keep his own milk records, and an outfit for obtaining the percentage of fat can be bought at a very moderate price from any dealer in dairy utensils.

Much more need not now be said, except that there are certain districts in South Africa where co-operative milk record societies could be started at very little cost to the farmer. In the end they will be profitable to him; however, he must be prepared for disappointments as to the produce of some of his cows, as he will be face to face with facts, and it will be on these facts that he will be able to build up a herd which will not only be a pride and a profit unto himself, but an envy to his neighbours. It may take years to do this, but he will have satisfaction in the end; his stock will be known throughout the country, and he will be able to sell his cows and bulls at a high price, because the purchaser will recognize that he has been breeding his animals on a commercial basis.

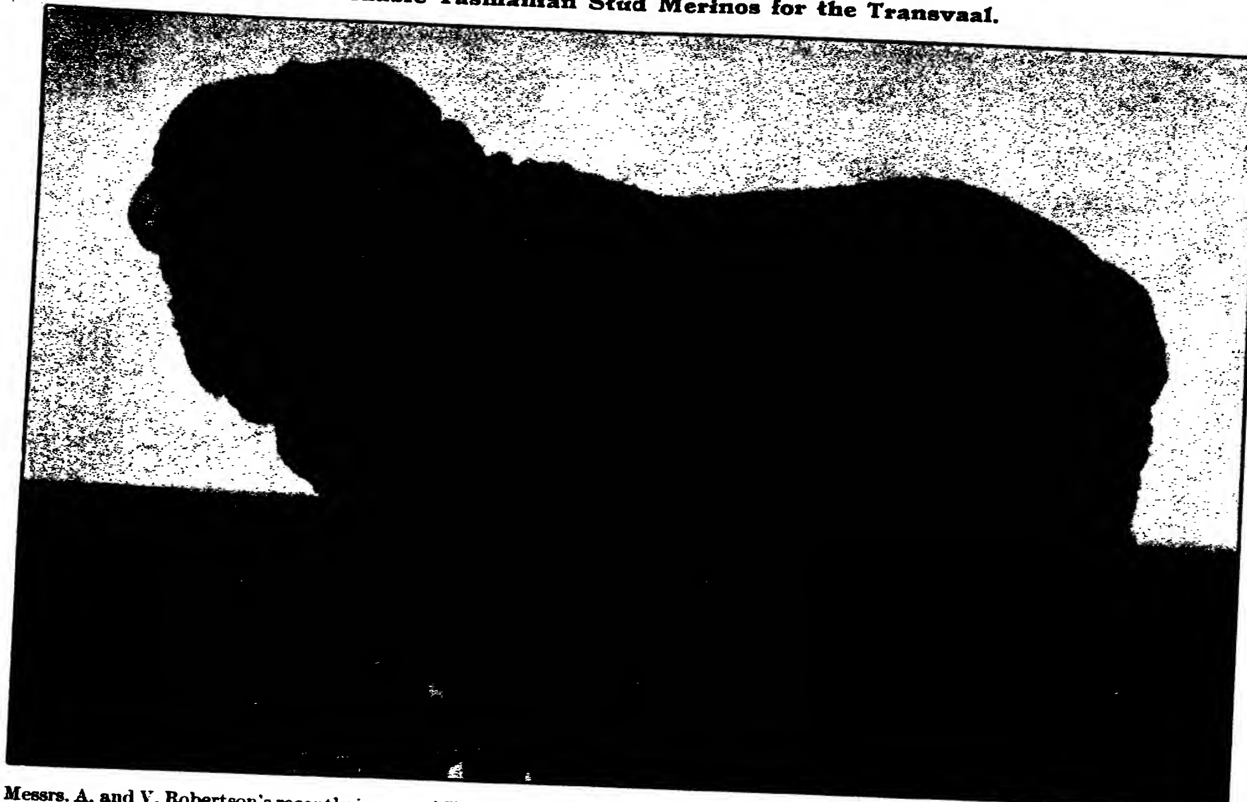
Valuable Tasmanian Stud Merinos for the Transvaal.

CHIEFTAIN IV., Tasmanian Stud Ram, imported by Messrs. A. and G. Robertson for their fine stud at Maquabie, Amersfoort, Transvaal. This ram was purchased by Mr. V. L. Robertson during his recent visit to Australia. CHIEFTAIN IV. is by Chieftain II., by Chieftain, by President II., by President, by Golden Horn II., by Golden Horn, by Treasurer, by Golden Tom, by Sir Thomas II., by Sir Thomas. Dam, a Champion Belle Vue first stud ewe by President II. CHIEFTAIN IV. was 3 years old June, 1911.

Valuable Tasmanian Stud Merinos for the Transvaal.

Zara, Stud Ram, purchased and imported by Mr. V. L. Robertson, who with his brother Mr. A. G. Robertson, are establishing a valuable stud at Maquabie, near Amersfoort, in the Transvaal.

Valuable Tasmanian Stud Merinos for the Transvaal.



Messrs. A. and V. Robertson's recently imported Tasmanian Ram PATRON IV., purchased privately by Mr. V. L. Robertson. PATRON IV. is by Patron II., by Patron, by President III., by President II., by President, by Golden Horn II., by Golden Horn, by Treasurer, by Golden Tom, by Sir Thomas II., by Sir Thomas. Dam, a first prize first stud Belle Vue ewe by Jubilee. This ram is added to Messrs. Robertson's stud at Maquabie, Amersfoort, Transvaal.

Experiments with Wheat Varieties in the Cape Province, 1910.

By W. J. Lamont, Acting Government Agriculturist.

In the September, 1910, issue of the *Cape Agricultural Journal*, a report was published on the relative rust-resistance and yield of various varieties of wheat and oats experimented with in the 1909 season.

During the year a considerable number of fresh varieties were imported, amongst them being a parcel of eight bags of Rietti Wheat. It was pointed out in the report last year that, although many attempts had been made, no one had succeeded in procuring Rietti Wheat identical to that imported fifteen years ago. The sample now to hand proves to be similar in every respect to what is now called Old Rietti, and known throughout the Western Districts as the best rust-resister in those parts. As already stated, Rietti has many undesirable qualities, such as its lateness, the ease with which it sheds its grain, and its bad milling properties, but our big wheat problem at present is the solution of the rust question, and Rietti so far has withstood rust attacks uniformly the best of all the introductions. A wheat which is gaining in favour is Gluyas Early. Its extreme earliness makes it suitable for almost any part of the country, except the Southern Coastal Belt. Some enormous yields have been chronicled from the Midland Districts of the Province. It is, moreover, a variety of which the millers are prepared to take any quantity.

It was thought that the Department would by now have been able to distribute small quantities of the hybrids secured by crossing Darling and Gluyas Early, Darling and Van Niekerk, and Gluyas Early and Du Toit. It was found, however, that some careful selection is still necessary, which will delay distribution for a season or two. The first-mentioned cross seems likely to prove a splendid wheat.

It will be noted that the yields are very low, due to seasonal causes, which changed what looked like a record harvest in the early stages into a very moderate one.

A large number of varieties were tested at the Barberton Experiment Station,.but very few have proved anything like rust-resistant, two types of Rietti (Theunissen, which is practically the same as the old Rietti, and Apulian Hard) being the only wheats which have not succumbed this season.

In the George District a number of varieties were tested under the supervision of Mr. De Wet of this branch. Of the varieties experimented with, Theunissen, Rietti, and Comet were the best from the point of view of rust-resistance and yield. As a large quantity of wheat is grown in the Humansdorp and Longkloof areas, new varieties are tested in that part of the country each year by Mr. K. M. Johnsen, the assistant stationed at Humansdorp. Mr. Johnsen reports that the variety locally known as Zwart Aar occupies the same position amongst the Humansdorp farmers as Rietti does in the Western Districts. It always yields a fair crop, but the resulting meal makes a somewhat heavy, dark loaf. Mr. Johnsen further reports that 1909 was a very unfavourable season for wheat in his area, and the yields were

consequently far below the average. The following are the reports on the varieties grown in the Humansdorp area:—

Gluyas Early.—Experimented with on twelve farms. Has not proved rust-resistant along the coast. Was not badly affected in the drier climate of the Longkloof, but did not yield very well there. Much better results were obtained in the Gamtoos River Valley, where the soil is rich and the climate dry.

Theunissen.—Good cropper; suitable for these parts.

Belotourka (a variety introduced from Australia).—Mr. Johnsen states that he considers this wheat the best of those experimented with this year, it being a hard and at the same time white wheat; stools well, and is a good cropper.

Thew.—Another Australian variety; had rust on straw, but not on ear. Fair cropper and worthy of another trial.

John Brown.—Gave results similar to Thew.

Medeah.—Imported and local seed were tried, the latter giving far better results than the former. This wheat is known locally as "Rust Proof", but was attacked by rust this season. It gives better results when sown late, say July. Having a stiff, strong straw, it will suit the Humansdorp area.

Zwart Aar.—This wheat is grown by nearly every farmer in the Humansdorp District, and is the most rust-resistant wheat known in these parts. A fair crop can always be relied on, but the resulting meal makes a somewhat heavy and dark bread.

Comeback, Jonathan, Purple Straw, and Cretan were also tried, but none proved suitable.

VARIETIES TESTED IN THE WESTERN PROVINCE.

A short description is appended of all varieties not described in the *Cape Agricultural Journal* of September, 1910, together with a table showing the relative rust-resistance of all varieties over a period of four years.

Dreadnaught.—Had rust badly. Sown 24th May, reaped 20th December, 1910. Short grower. Stools well. Short, beardless ear. Sheds grain easily. White, soft, longish grain. Yield, 400 lb. grain per acre.

Fultz.—Not rust-resistant. Sown 24th May, reaped 10th December, 1910. Short grower. Short, beardless ear. Sheds grain easily. White, hard, roundish grain. Yield, 250 lb. per acre.

Gipsy.—Not rust-resistant. Sown 24th May, reaped 10th December, 1910. Short grower. Short, bearded ear. Sheds grain easily. Dark, hard, long grain. Yield, 400 lb. grain per acre.

Harvest Queen.—Not rust-resistant. Sown 24th May, reaped 10th December, 1910. Strong straw. Short grower. Stools well. Long, beardless ear. Dark, soft, roundish grain. Yield, 478 lb. grain per acre.

John Brown.—Not rust-resistant. Sown 24th May, reaped 10th December, 1910. Short grower. Short beardless ear. White soft roundish grain. Makes good bread. Yield, 320 lb. per acre.

Kolben.—Resisted rust this year. Sown 24th May, reaped 24th November, 1910. Early variety. Strong straw. Good grower. Stools well. Short, bearded ear. Reddish, hard, long grain. Makes good bread, but little dark. Yield, 560 lb. grain per acre.

Macaroni or Nicaragua.—Not rust-resistant. Sown 24th May, reaped 10th December. Short grower. Stools well. Short, bearded

ear. Sheds grain readily. White, hard, roundish grain. Yield, 320 lb. grain per acre.

Algerian Hard Wheat No. 32.—This wheat was supplied by the Consul-General for France. Sown 24th May, reaped 2nd December, 1910. Strong grower. Very strong straw. Bearded, sheds easily. Dark, hard grain. Yields 800 lb. grain per acre. Resisted rust this year.

Algerian Soft Wheat No. 34.—Same origin as above. Not rust-resistant. Sown 24th May, reaped 2nd December, 1910. Short grower. Strong straw. Stools well. Beardless. Sheds grain easily. Soft, white grain. Yield, 550 lb. grain per acre.

Australian Coarse Straw.—Not rust-resistant. Sown 24th May, reaped 10th December, 1910. Short grower. Strong straw. Stools well. Bearded. Sheds grain easily. Dark. hard, long grain. Yield, 475 lb. grain per acre.

Bearded Winter Fife.—Not rust-resistant. Sown 24th May, reaped 10th December, 1910. Short grower. Strong straw. Stools well. Bearded. Sheds grain easily. Dark, hard, long grain. Yields 475 lb. grain per acre.

Belotourka.—Not rust-resistant. Sown 24th May, reaped 6th December, 1910. Strong straw. Does not stool well. Short, bearded ear. White, hard, long grain. Sheds grain easily. Makes good bread. Yield, 400 lb. grain per acre.

Comeback.—Is rust-resistant. Sown 24th May, reaped 24th November. Early variety. Good grower. Stools well. Short, beardless ear. Sheds grain easily. White, hard, roundish grain. Yield, 720 lb. per acre.

Red Marvel.—Not resistant. Sown 24th May, reaped 10th December, 1910. Short grower. Stools well. Short, beardless ear. Reddish, hard, round grain. Yield 575 lb. grain per acre.

White Marvel.—Not resistant. Sown 24th May, reaped 10th December, 1910. Short grower. Long, beardless ear. White, soft, longish grain. Yield, 400 lb. grain per acre.

Nigger.—Not rust-resistant. Sown 24th May, reaped 10th December. Short grower. Long, bearded ear. Dark, hard, longish grain. Yield, 477 lb. grain per acre.

November Manitoba.—Not rust-resistant. Sown 24th May, reaped 10th December, 1910. Short grower. Short, beardless ear. Dark, hard, roundish grain. Yield, 400 lb. grain per acre.

Phillipolis.—Not rust-resistant. Sown 21st May, reaped 10th December, 1910. Short grower. Stools well. Short, beardless ear, but very well filled. White, soft, roundish grain. Yield, 1128 lb. grain per acre.

Riet.—Is rust-resistant. Sown 21st May, reaped 10th December, 1910. Strong grower. Stools well. Long, beardless ear. Red, soft, roundish grain. Makes good bread, but little dark. Yield, 800 lb. grain per acre.

Red Wonder.—Is not rust-resistant. Sown, 24th May, reaped 10th December, 1910. Short grower. Stools well. Short, bearded ear. Reddish, hard, round grain. Yield, 450 lb. grain per acre.

Sensation.—Not resistant. Sown 24th May, reaped 10th December, 1910. Short grower. Short, beardless ear. Sheds grain easily. Red, hard, roundish grain. Yield, 400 lb. per acre.

Sibleys New Golden.—Not rust-resistant. Sown 24th May, reaped 10th December, 1910. Short grower. Short, bearded ear. White, soft, roundish grain. Yield, 320 lbs grain per acre.

TABLE SHOWING RELATIVE RUST-RESISTANCE OF WHEAT VARIETIES TESTED IN THE WESTERN PROVINCE, 1907-1910.

Variety.	Whether Rust-resistant or Not.					Yield in lb. grain per acre.
	1907.	1908.	1909.	1910.		
	Robertson.	Langeberg.	Langeberg.	Langeberg.	Robertson.	
Algerian Hard No. 32.	—	—	—	Yes	—	675
Algerian Soft No. 34...	—	—	—	No	—	470
Apulian Hard.........	—	—	—	—	Yes	—
Australian Coarse Straw	—	—	—	No	No	477
Bearded Winter Fife...	—	—	—	,,	,,	477
Belotourka............	—	—	—	Yes	,,	400
Bobs or Darling.......	—	Yes	No	,,	—	1034
Brown Caledon Baard..	Slightly	No	,,	,,	—	796
Comet................	—	—	—	—	No	—
Comeback.............	Yes	No record	Rust on straw	Yes	—	716
Cretan................	—	—	—	—	No	—
Darlvan, A, B, and C.	—	—	—	Yes	—	—
Dreadnaught..........	—	—	—	No	No	400
Durum...............	No	No	None in ear	Yes	—	796
Du Toits.............	,,	,,	Yes	,,	—	955
Federation...........	Rust slightly	Rust slightly	No	No	—	318
French...............	,,	No	,,	,,	—	636
Fulcaster............	—	—	—	,,	No	—
Fultz................	—	—	—	,,	,,	238
Government..........	—	—	—	,,	,,	—
Gypsy...............	—	—	—	,,	,,	400
Gluyas Early..........	Yes	Rust on straw	Rust on straw	Yes	,,	955
arvest Queen........	—	—	—	No	,,	477
Hudson's Early Purple Straw............	—	—	—	—	,,	—
John Brown..........	—	—	—	No	,,	318
Kolben..............	No	No	Yes	Yes	,,	557
Macaroni or Nicaragua.	—	—	—	No	,,	320
Mediterranean.........	—	—	—	,,	,,	—
Red Marvel..........	—	—	—	,,	—	573
White Marvel.........	—	—	—	,,	No	398
Van Niekerk..........	No	No	Yes	Yes	—	955
Nigger...............	—	—	—	No	No	477
Nobbs, A, B, and C...	—	—	—	Yes	—	—
November Manitoba...	—	—	—	No	No	398
Phillipolis............	—	—	—	,,	—	1128
Poole................	—	—	—	,,	No	—
Riet.................	—	—	—	Yes	—	796
Old Rietti (1896)......	—	Yes	Yes	,,	No	875
New Rietti (1910).....	—	—	—	,,	,,	923
Local Rietti..........	—	—	—	—	Yes	—
Longeared Rietti......	—	—	—	—	,,	—
Red Wonder..........	—	—	—	No	No	445
Red Marvel..........	—	—	—	—	,,	—
Roermaker...........	No	Rust on straw	No	Yes	—	955
Sensation............	—	—	—	No	No	398
Sibley's New Golden...	—	—	—	,,	,,	318
Siebritz..............	—	Rust on straw	Yes	Yes	—	955
Treasure.............	—	—	—	No	No	398
Spring...............	No	Yes	Yes	Yes	,,	1114
Taganrog............	—	—	—	—	,,	—
Theunissen...........	—	Yes	Yes	Yes	Yes	955
Thew................	—	—	,,	No	No	557
Turkish Red Winter...	—	—	—	,,	,,	318
Union, A, B, and C...	—	—	—	Yes	—	—
Wit Wol.............	—	—	—	—	No	—
Rooi Wol.............	—	—	—	—	,,	—

Some Diseases and Parasites of Ostrich Chicks.

BEING NOTES ON DRONKZIEKTE, OPHTHALMIA, EVERSION OF RECTUM, TAPE-WORM, AND WIRE-WORM.

By W. Robertson, M.R.C.V.S., Acting Assistant Director of Veterinary Research (Cape).

Although the continued advance in the price of the ostrich feather has attracted much attention and capital to the industry of ostrich farming, our information upon the diseases of the bird, particularly when in the chick stage, is still very scanty. When men, to whom farming is a new thing, or new as far as ostriches are concerned, start, there are bound to be many mistakes made, and as a result many failures must follow. The great difficulty of the observer is to distinguish between the mortality amongst chicks due to bad management and the mortality due to the ravages of a specific disease. Many men when first visiting a prosperous ostrich farm and seeing the trim breeding camps with their aggressive and well-fed occupants, and hearing that last season's chicks fetched an average of £10, and all this season's are booked (before even the eggs are laid) at a higher figure, are inclined to think that this style of farming is Utopian, and that it is "picking up money". They straightaway invest in high-priced birds and start in chick-rearing; the results are frequently disastrous.

It is not my province, nor my intention in the present instance, to deal with the subject of chick-rearing; every district, and every farm, let alone often every man, has his own idea on this matter. But there are certain broad principles common to all, and it is not out of place to make some slight mention of them before dealing with one or two of the chick ailments which have come under my notice during the past two seasons; and though the work in their connection has been fragmentary and inconclusive, I think that what knowledge is at hand should be placed at the disposal of the new industry, as it is only by extensive experiments (impossible in a laboratory) carried out by the farmer himself that we can learn how the theoretical experiment will work out in practice. Many men taking up ostrich-breeding and having in view the rearing of chicks for sale, and to strengthen their feather flock, mate unsuitable birds; I say unsuitable for mating though they may both be first-class birds. I take it that the position is just this: the average ostrich is no more pure bred than the ordinary horse, and any farmer knows what is the result of breeding from half-bred stock as far as results are concerned, and how very unlike either parent the progeny may be. To take another simile: if one were to mate a white barn-door cock and a white barn-door hen, the eggs would hatch piebalds, white, blacks, etc., i.e. the progeny were displaying the trait called "atavism", or throwing back to some earlier ancestor. But if you bred the

selected white chick along the same lines, always selecting those likest the type you wished to produce, in time you would get a breed from a pair of which you might reasonably hope to get a fair percentage of chicks reproducing the parent type. So in the ostrich; you can mate a fine cock and a fine hen, and get chicks which are absolutely rubbish, but certain breeders have now so bred from certain strains that the greater percentage of their chicks throw true to parent type. Again, certain strains will, as the breeder says, "nick" with each other, and this should be borne in mind when selecting pairs, otherwise you get the chick not only mixed in quality but many may be inferior to the parents.

Hatching.—I must here say a few words on this, as on the constitution of the chick depends his fitness to survive the troubles of his early life. Natural hatching, under a shelter, is no doubt the best plan; but as a bird starts sitting after laying the clutch of eggs she can cover, a man who has given a long price for a pair of birds wants more eggs from the pair than this. The usual plan to adopt is to take the eggs away as laid, transfer to the incubator or other hen, and allow the hen to sit on her second or third nest. Personally I think it is a great mistake to let a hen have three nests in one season. The chicks of the last eggs are often unfertile, and it stands to reason that the chicks cannot be so sturdy or start life with the constitutions of those off the first nest, when the parents were in the vigour of the early mating season. I also think it is wrong to excite a cock bird's sexual appetite with such drugs as cantharides, cayenne pepper, etc., *for a prolonged period of time.* A few doses at the commencement of the season may make a backward bird pair and start the breeding, and do no harm, but it is this continual excitation of the sexual functions that I think is useless. You can certainly increase the frequency of the sexual act, but you cannot increase the percentage of fertile eggs by that method.

Breeding pairs are generally camped off in May, and by the end of that month may have nests. The plan is to feed heavily until the hen starts laying then reduce rations a little. Personally I think from what I have seen that too fat parents produce a large percentage of unfertile eggs, and I do not like to see too fat *breeders* camped off.

Chicks.—Chicks begin to appear about the end of May or even earlier, and the best chicks are those which get a fair start before the cold weather of August commences. The most successful chick-rearers never give the newly hatched birds food for at least twenty-four hours. The yolk sac of the ostrich persists for nearly ten days after the chick has hatched and affords quite enough nourishment for the first twenty-four hours of the creatures' existence. It is also the persistence of this yolk (or yelk) sac which accounts for the chrome yellow-coloured liver of the young ostrich chick.

Chicks should have as much sun and light and air as possible. Cold will not hurt them and they stand a lot of rain. Wind is their worst foe. When this blows they simply lie down and refuse to feed, and dwindle away. The most critical time for chicks is at fourteen days old, over that they go ahead.

Administration of medicine to chicks.—Ostriches are comparatively easy things to dose, their oesophagus is big, and the risk of choking (provided care is taken) infinitesimal. Liquid drugs are generally given from a small narrow-mouthed bottle, and solids in the form of pills. I have lately used with much success as a medicine

vehicle the gelatine capsules in which are wrapped horse-balls (similar to the gelatine capsules of the human pharmacist on a large scale). These are neat, clean, and easy to administer, there is absolutely no danger of choking, and the dose can be made ready. It is somewhat of an undertaking when one has to dose say eighty chicks with oil on a cold morning; the oil does not completely leave the bottle, runs over the neck, and the result is each chick does not receive exactly the dose we want it to. With capsules, the lot can be charged the night before and remain ready for the morning. They are worth a trial by ostrich men, and are very cheap. (For notes of dosing ostriches see "Notes on the History of the Wire-worm", *Cape Agricultural Journal.*)

DRONKZIEKTE IN CHICKS.

Here the chicks seem to lose the power of maintaining their balance (quite distinct from paralysis), as it is termed, loss of co-ordination of movement. Generally seen in chicks from two to six months old; they seem to stagger, stand on tiptoe, and to be continually on the verge of falling forward, and using the half outstretched wings as a balance; feed well and are often very fat. Sometimes only a percentage of the batch are affected. The attack appears suddenly and does not appear to spread from bird to bird.

This affection is a very annoying one; it throws chicks back in condition just at the critical growing and developing time of their lives. If chicks two or three months old get anything the matter with them they never seem to grow out, and are always stunted and undersized all their lives.

Cause.—I have not had much experience with the treatment of this disease; the seven outbreaks I have seen have been at such distances from town that personal supervision and the studying of the effects of various drugs was impossible. Post mortem shows the body to be absolutely normal, and opinions are divided as to the actual cause of the disease. It may be due to some strain in the birds' breeding, producing nervous lesions in the brain, or due to the direct effects of some specific germ. It is difficult to accept the vegetable poison theory, as only a percentage out of a lot running together show the symptoms.

Treatment.—In the few outbreaks where I have been able to give the matter personal supervision I found good effects from the administration of a purgative, followed by repeated doses of a nervous sedative.

Case I, 18th February, 1911.—A farmer in the neighbourhood called *re* above disease in his chicks; had about twenty in a lot of fifty affected; gave two lots of pills, one containing aloes barb. gr. X, the other chloral hydrate gr. XX, with instructions to give the aloes pills first and then follow up with daily dose of the No. 2 pill.

21st February, 1911.—Visited the farm and saw chicks: owner says they are better; no more sick.

25th February, 1911.—Saw chicks again; those which were affected are all doing splendidly, but are going to be stunted in growth, having received a check or set back, and will never probably grow out to the same size as their contemporaries; the feathers of the affected chicks without an exception show a deep distinct "bar".

OPHTHALMIA, OR INFLAMMATION OF THE EYE IN OSTRICH CHICKS.

During the past season several breeders have been troubled with a variety of ophthalmia in their chicks and half-grown birds. The disease starts somewhat suddenly and is undoubtedly infectious. At first there is blinking of the eyelids, a flow of tears, and in a couple of days the lining membrane of the eye becomes inflamed and angry-looking, the lids are kept closed, and the watery discharge (in some cases) changes to pus, which glues up the eyelids. On forcibly opening them the eye is full of a thick sticky material, and the eyeball itself is blue and blurred. If left untreated, or treated improperly, several things may happen, and the sight of the eye may be lost or permanently impaired. After recovery one can often notice which birds have been affected by the puckering of the eyelids.

Infectious Nature of the Disease.—Observations, and the opinion of the farmer, pointed to the infectious character of the disease. In order to settle it I carried out the following experiment:—Three ostrich chicks, four months old, were confined in a pen which had never before held birds. A swab of cotton-wool was then taken and rubbed over the eyelids of an affected bird and transferred to the eyes of the clean birds. Ophthalmia appeared on the morning of the fourth day in all three. This experiment was repeated and gave identical results.

Treatment.—This will also include prevention. As soon as the disease appears the farmer must isolate the affected bird, and dress, not only it, but all the rest of the flock. I have seen an outbreak cut short by careful daily dressing of all the in-contact birds.

I have tried many remedies, including sulphate of zinc, boracic acid, lead lotion, ointments, etc., and find the best results to follow the free use of a weak solution of corrosive sublimate in water, 1 to 5000 (better get this made up by the chemist). I use an eye-dropper, or an ordinary fountain pen filler will answer very well, and at first the dressing should be carried out twice daily. Run the bird into a plucking box, catch them by the lower jaw, turn the head on one side, and drop in about ten drops of the solution, let the superfluous liquid run out around the eye, dress the other eye similarly, and let go.

So far this treatment has been an unqualified success. Care must be taken with the lotion, which should carry a poison label. I will just give in detail the course of an ordinary outbreak:—Mr. H. M., farmer, near Grahamstown, when seen, had thirty chicks affected. First symptom noticed was swelling of the eyelids, which rapidly became distended with a clear fluid (subsequently purulent), a purulent exudate appeared along the inner edges of the eyelids, in many cases gumming them together. Nine of the chicks were four months old, the remainder varied from six to nine. There appeared to be much irritation and pain, the birds were constantly shaking the head and rubbing the eye on bushes, fences, and one another. The owner thought the chicks contracted the disease from sleeping in low-lying river paddocks, and suggested as a direct cause the "bites of insects", mosquitos, etc. These birds were treated twice daily with 1 in 5000 watery solution of perchloride of mercury; the results were very satisfactory. Several were not treated; in these the disease ran its course in about twenty days; one chick lost the sight of one

eye, in others the eyelids showed marked and lasting irregularities; the eyelashes were twisted, and there was marked puckering of the skin of the orbit, and even after an elapse of four months the eye lesions can be noticed in the untreated birds, though all inflammatory changes subsided three months ago.

I have met with several cases of blindness and defects in sight in old birds, directly traceable to a previous attack of ophthalmia.

EVERSION OF THE RECTUM IN CHICKS.

This should more correctly be termed, Eversion of the Cloaca, the end of the gut.

This is a somewhat common complaint, and in some seasons assumes the nature of an epidemic. The course of the disease is often very rapid, and the mortality assumes a high percentage.

The disease principally affects chicks of a few weeks old, but I have seen several cases in old—even in a sitting bird. It commences by a straining, and wetting of the feathers around the anus, which are soiled with the discharge. There may, at this stage, be some slight protrusion of the gut; this gets more pronounced, until a piece the size of a sausage appears, and may even get so large that the chick can tread on it. I have seen it in a month-old chick assume the size of a large oval orange.

Treatment.—In the advanced stage little can be done. I have replaced the gut after bathing in alum and warm water, and kept it in site with a stitch, " figure of eight fastening ", from skin to skin across the rectum. As soon as a case is noticed I advise getting the following made up at the chemist's:—No. 1: gelatine capsules, each to contain castor-oil half an ounce, and sandal wood oil half a drachm. Get as many doses as you have chicks and give at once, next day, and for the two following days, i.e. three doses in all; Pill No. 2: each to contain powdered opium 25 grains, prepared chalk 30 grains, and powdered ginger 20 grains.

I am of opinion that the cause is some irritant in the urine (the bird has a common orifice for the evacuation of the contents of kidney and bowel). This irritant acts upon the soft mucous lining of the end of the gut (the chick is growing fast and the tissues are soft and yielding and not set), causing much straining, a small part protrudes, the muscle at the orifice of the anus then contracts and confines that piece into which blood comes and cannot get back, it swells further, more gut is protruded, and so on.

I am very satisfied with this treatment; it is worth a trial.

PARASITES IN OSTRICH CHICKS.

The external parasites of ostrich chicks affect them and us very little, and it is the internal, or intestinal parasites, which cause often serious mortality, and always much loss of condition.

It cannot be too often urged that unless chicks have a good start they will be more or less handicapped for the greater part of their career, both in regard to constitution, size, and feather production. Prof. Duerden has shown most clearly that *any set-back to a bird can*

produce a bar or irregularity of growth in the feather at that time; and I think that the often defective tips in spadonas and first after chicks are due to the presence of internal parasites. The chick, at the early stage of its existence, is growing very rapidly, and cannot grow out and develop in the way it should when its constitution has to support, in addition, a mass of tape-worm, or even wire-worm.

TAPE-WORM.

I have heard a breeder say "All chicks have tape-worm". That is not strictly correct, but tape-worm is more or less a disease only affecting young birds. It is rare to find a full-grown bird so affected, but I have seen the gut of young birds so full of the parasite that it was a matter for wonder how even the food managed to pass along.

The tape-worm of the ostrich (*Taenia struthionis*) belongs to the class of parasites which require two animals or hosts for their complete life cycle, just as in the case of the tape-worm of man; there the worm is voided and picked up by the pig, in whose body it develops into the little bladders called measles; man eats this flesh, and in his body these bladders again grow into worms. In the case of the ostrich tape-worm we do not yet know what is the other animal through whose body the parasite must pass to complete its life cycle, and when one thinks of the immense number of animals in the veld who might act as this intermediary bearer (as it is termed), the search will doubtless be a long one.

Age at which the Chick becomes Infected.—Ostriches can, and are, reared without ever becoming infected with tape-worm. This sometimes occurs on veld new to ostrich farming. There, no doubt, the intermediary bearer, if it exists, is still uninfected; but sooner or later a fresh batch of chicks is brought and starts the parasite.

I have found chicks as young as three weeks well infested with the parasite, and from that age on to maturity, say two years old, they are the commonest parasite of young birds.

Symptoms.—If conditions are good and the food plentiful the birds can nourish both their own constitutions and the tape-worms, but if the food ration falls, climatic condition becomes unfavourable, or the chick becomes ill, the parasites are served first and the birds' constitution suffers. The symptoms are those of general ill-health, paleness of the mucous lining of eye and mouth, and the presence of expelled portions of the worm in the dung; this, of course, is the best and only certain symptom. These *nits* as they are termed are the ripe segments from the hinderpart of the body of the tape-worm, and are in reality simply sacs of eggs, and are always found on the outside of the dung pellets, having been brushed off from the parasites' body in the passage of the dung through the bowel.

Treatment.—The removal of the tape-worm is simple enough and accompanied by very little danger. For their eradication I find nothing so good, certain, and safe as *Petrol—Motor Car Spirit, Pratt's Green Label.* Care must of course be exercised in the dosing; a drop of petrol—or for the matter of it almost any liquid—down the bird's windpipe will be accompanied by serious and often fatal consequences.

In drenching birds it is always advisable to cover the opening in the windpipe with the fingers of one hand, and pass the bottle over them; it is also well to hold up the bird's head after drenching for a few minutes. Some birds possess the power of inverting the neck

and regurgitating fluid from the stomach; this if it runs into the mouth may also run into the windpipe and choke the bird. Petrol is not poisonous in anything like reasonable doses. For instance, I have given a two-year-old bird a wine-bottle (27 ounces) daily for fourteen days, and a six-weeks-old bird 10 ounces daily for a similar period of time, without producing any ill-effects. I find an occasional dose of petrol to chicks of marked benefit, and its use is very widespread in the ostrich-breeding districts, where some men I know dose every six weeks as a regular thing.

I am of opinion that tape-worms do more harm than we think, and injure the bird in other ways than by merely abstracting so much nourishment from the body. Wherever a tape-worm attaches itself by its row of hooks it makes an actual wound in the bowel wall; this makes a breach in the body's defences for the inroad of germs from the bowel, and I believe that this is the way some of the ostrich chick epidemics start. I have counted in one ostrich of nine months old over *two hundred tape-worms*, the aggregate weight of which was nearly *three pounds*, and the amount of nourishment necessary for their subsistence must have been considerable.

In experimenting with petrol I find the following list of doses quite safe; in several instances much more can be given with safety, but was, I take it, simply wasted.

It is advisable to fast chicks a little before dosing, but if they are at all weak or thin do not starve for the first dose. The petrol being volatile at a temperature lower than the bird's body speedily becomes vapour, and penetrates through the whole of the bird's intestinal tract in a remarkably short space of time.

Dose of petrol, given pure:—

1 and 2 months old birds get	½ oz.
3	1 oz.
4	2 oz.
5	3 oz.
6	4 oz.
7 to 11	5 oz.
12	6 oz.
Full-grown	8 oz.

It is emphasized that the petrol must be given *pure*, not mixed with water.

WIRE-WORM OR "VROT-MAAG".

This parasite, and some notes on its life history, has been dealt with in the *Cape Agricultural Journal*, August, 1910. I am still of my opinion that the best method to eradicate these parasites is by repeated dosing with lime and sal ammoniac. I have dosed at three weeks' intervals (with a preliminary dose of paraffin) without any ill-effects on the bird's constitution, and with most beneficial results in regard to the wire-worm, for twenty-seven weeks, i.e. nine times, simply to prove to my own satisfaction that the dose had nothing in it deleterious to the bird's constitution, and that there was no harm in repetition. It is useless to attempt to get rid of this parasite by one or two doses, and the golden rule for a breeder on a farm where wire-worm (*S. Douglassii*) is rife is watch your chicks and dose before they get too bad. If you wait until they are down in condition some will certainly die, whatever you dose with.

Symptoms.—These have already been gone into; the bird goes off condition, the subcutaneous tissue and skin becomes white, instead of the golden yellow colour seen in healthy birds, the mucous lining of the mouth and eye socket become pale and white, and there is often an abnormal amount of chalky deposit in the dung.

Post-Mortem Appearances.—The wire-worm is only met with in the upper part of the stomach (see article " Notes on some diseases of the Ostrich ", *Cape Agricultural Journal*, January, 1910), hence the difficulty of eradicating them. They are small and hair-like, and often require some searching for before they can be demonstrated. If the infestation is a bad one the worms by their irritation cause the lining of the stomach to throw out a thick paste, like starch; this gives the stomach a curious appearance, sometimes called " *Vrot-Maag* ". In such a case this exudate must be scraped off before the worms can be demonstrated. It must be borne in mind that the gastric juice of the stomach rapidly dissolves the wire-worm once the bird is dead (and the parasite also), and a bird dead from wire-worm may not show a single parasite if the body is left lying overnight. I have demonstrated this several times thus: kill a bird badly infested with wire-worm, open the stomach sufficiently to demonstrate the presence of the parasite, then close up the stomach, and return to the body in twelve hours; you will then be unable to demonstrate the presence of a single wire-worm in that bird's stomach.

One fact I have noticed, and ostrich men are of the same opinion, that a bird badly infested with wire-worm is very disinclined to eat mealies, and if a bird goes off this kind of feed that their presence must be suspected. Perhaps the digestion of mealies gives the bird pains under such conditions.

Treatment.—The doses of sal ammoniac and lime, with the preparatory doses of paraffin (to remove the coating from the stomach), have been printed in the *Cape Agricultural Journal*, and leaflets of the dosages can be obtained on application to the writer at the Veterinary Laboratory, Grahamstown.

The full details then published are as under:—

Preparatory Paraffin Dose.

6 weeks old birds	...	...	4 drms. or ½ oz.
2 months	,,	...	... 6 drms. or ¾ oz.
10 weeks	,,	...	... 8 drms. or 1 oz.
3 and 4 months	,,	...	... 2 oz.
6 ,,	,,	...	... 4 oz.
9 ,,	,,	...	... 6 oz.
12 ,,	,,	...	... 8 oz.
18 and 24 ,,	,,	...	... 12 oz.

Put the birds in a kraal in the early morning, keep without food all day; at night, say 5 p.m., give the dose of paraffin; still starve until next morning, and then give the lime and sal ammoniac:—

4 months old birds and under, as much as will lie on a shilling of each.
6 months old birds, a small teaspoonful of each.
9 months old birds, a heaped teaspoonful of each.
12 months old birds, a half-ounce of each.
Full-grown birds, one ounce of each.

The small doses can be given in, say, 4 ounces of water each, and increased up to 13 or 15 ounces for the full-grown doses.

The lime does not dissolve, and must be given mixed with the water. I have two bottles with a dose in each and drench in quick succession, employing the usual precaution to avoid getting anything into the windpipe. I have given as much as 2 ounces each of lime and sal ammoniac, and though the bird certainly seemed distressed it was more due to the mechanical evolution of ammonia gas than the chemical effect of the drugs. The effect of the medicine is very slight and soon passes off.

After the doses of lime and sal ammoniac give the birds a few mealies or a little chopped green-stuff. Do not let them out into a field of lucerne or rape, else they are apt to over-gorge themselves after their fast.

The sal ammoniac can be purchased at any chemists or ironmongers, as it is used for the filling of certain electric battery cells.

The lime is ordinary slaked lime, which I pass through a sieve to remove stones, etc. This dose can be repeated in a fortnight.

If by accident an overdose of this sal ammoniac and lime is given it will be well to give an ounce of whitening in a bottle of water.

DOSING BIRDS.

Though an ostrich has a neck and throat like a six-inch drain-pipe he requires some care and precaution in dosing. The following remarks are not intended for the expert ostrich farmer (to whom I am indebted for most of my information on the subject) but to young beginners who are carrying out the "back to the land" axiom now the ostrich industry is yielding such a golden harvest.

When possible always precede the wire-worm dose by some cleansing substance to remove the sticky covering (which protects the parasite) from the stomach walls. Petrol or paraffin are both good.

If possible dose on an empty stomach; the drug loses much of its value when mixed with a stomach full of food.

Use a suitable bottle, varying with the size of the birds. I find a nice series to be:—A castor-oil bottle, a small Van Riebeek bottle, and a long-necked Drakenstein bottle.

Tin bottles with an air-hole are on the market. I do not fancy them; the mouth gets rough and the finger slips from the air-hole, and one gets the drug over the face and clothes.

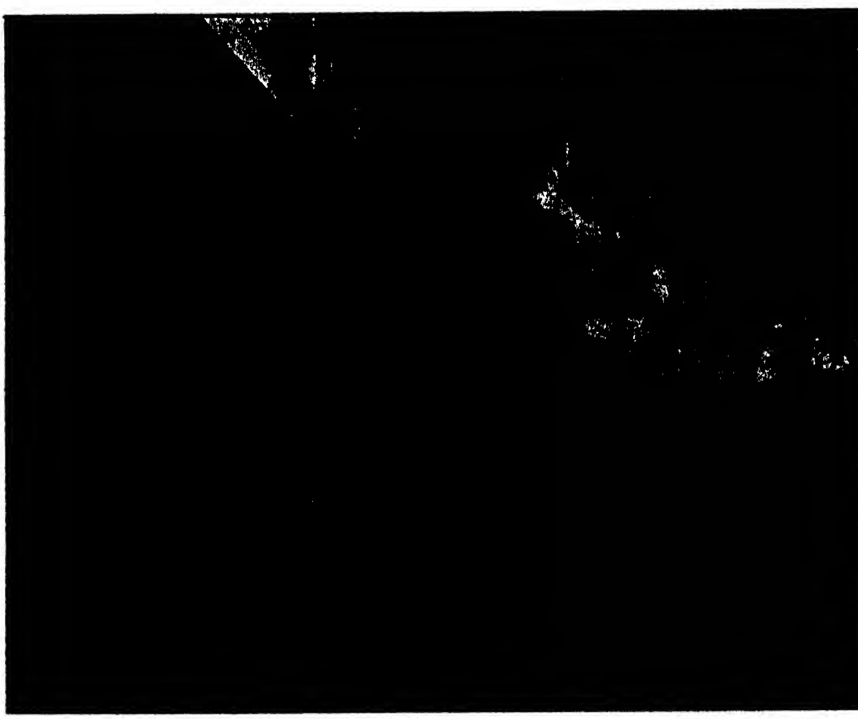
Stand in front of the bird, keeping clear of the legs; have a boy to each wing, and see they grasp the root of the wing and the body—I have seen a bird ruined by a wing becoming dislocated as the result of pulling on the tip. Then seize the bird's lower jaw with the left hand, shove the first, second, and third fingers over the opening of the windpipe in the floor of the mouth, the thumb being under the lower jaw. Slip the neck of the bottle over the fingers and well down the gullet, empty, and withdraw the bottle, hold up the bird's head for a second or two, as some of them possess the power of inverting the beak and literally pouring the medicine out of the stomach, or rather the lower part of the gullet.

A New Breed of Maize: The "Mercer".

By JOSEPH BURTT-DAVY, F.L.S., Government Botanist.

AT the Durban Show, 1911, Mr. W. Mercer, of Cato Ridge, Natal, exhibited ears of a white dent maize showing special depth of grain, which attracted considerable attention. This breed won prizes both at Durban and Camperdown, and I took an early opportunity of obtaining information about it, visiting Mr. Mercer's farm and having a look over his crop both in the field and in the barn.

Mr. Mercer informed me that about seven years ago he planted for comparative test alongside of his " Hickory King ", seed of the



Surplus Crop of Mercer Maize after filling Barn.
Photo by J. Burtt-Davy at Mr. Mercer's farm, Cato Ridge.

" North American Horsetooth "* which had been introduced by Mr. Gavin, of Umlaas Road. Some two years later he found that his Hickory King crop produced a number of ears carrying twelve rows of grain of a much deeper character, somewhat resembling the " North American ". These he selected and planted by themselves, with the result that he obtained from among the progeny both eight-row Hickory King and the deep-grained twelve-row type, some ears also producing ten rows. By continued selection of the twelve-rowed,

* I.e. "Virginia Horsetooth."

deep-grain ears his crop now produces mainly that type, although it still produces some eight and ten rowed ears.

Although the characteristic features are not yet fully fixed, the type is so distinct and of such excellent quality, and is, moreover, proving such a good yielder (as is to be expected where the grain is of such depth) that it seems worthy of a distinctive name; I therefore propose to call it the "Mercer" after the gentleman on whose farm it originated and who had the good sense to see that it was worth keeping as a separate breed. With a little patience the type will no doubt become fixed and any undesirable characters, such as an occasional red cob, will be eliminated. On mentioning my intention to Mr. George Carter, of Maritzburg, he told me that he had noticed this maize some two or three years ago, had bought part of Mr. Mercer's crop, and had sold it under the name of the "Mercer".

Grains of Mercer Maize.

Grains in top row, ⅞ in. long; in middle row, 1⅛ in.; in bottom row, ¾ in. long.

The following is a description of ear No. 11137, which is the best of the ears which I selected from Mr. Mercer's exhibit at the Durban Show:—

Ear.—Length: 9 in.; shape: slowly tapering; circumference 2 in. from butt: 7 9/16 in.; rows: twelve; arrangement of rows: in pairs; sulci: ⅛ in. between pairs, less between the rows of a pair; butt: deeply rounded, slightly enlarged, rows regular, passing straight over; tip: regular rows up to the end; shank: ¾ in. diameter; weight: 16.5 oz.

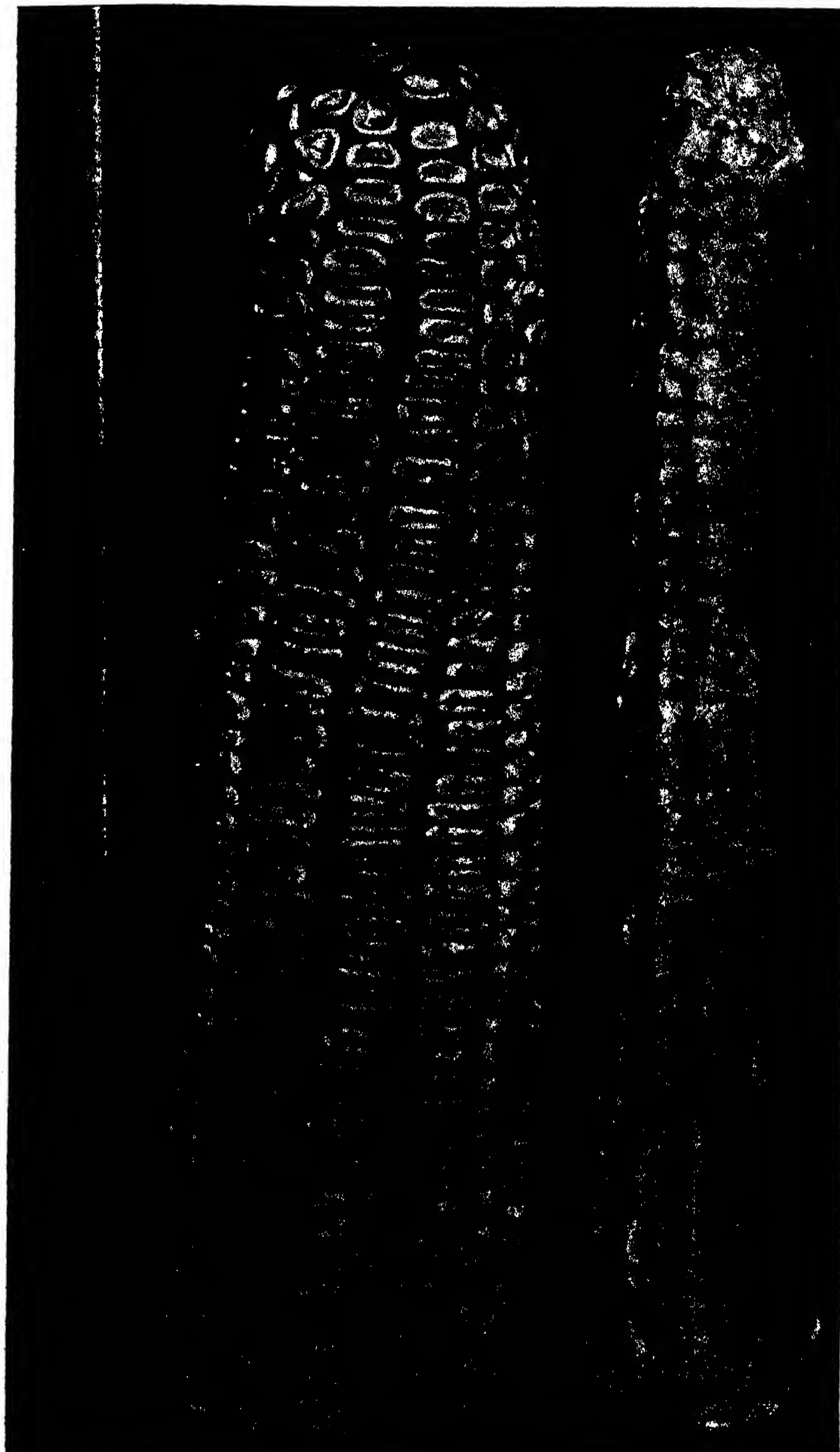
Cob.—Size: medium, 4¼ in. circumference at 2 in. from butt; colour: white; weight: 2 oz.

Grain.—Condition: firm, upright, very rigid; colour: cream white; indentation: roughish; form of dent: pinched crease; shape: medium wedge; length: 10/16 to 12/16 in. (measurement of grain from several ears); width at apex: 8/16 to 9/16 in. (measurement of grain from several ears); per cent. of grain to ear: 87.5; number of grains per ear: 600; weight per ear: 13.5 oz. (weighed in Pretoria, 25th August, 1911; the weight of grain from five ears weighed at the Durban Show averaged 14.2 oz. per ear).

Asked why Mr. Mercer had discontinued the "North American", he replied that he found it unreliable, in some years developing no cobs. The new cross, however, has proved entirely reliable since he grew it as a separate crop, and he has now discontinued "Hickory King" in its favour. I am informed that another farmer in the district has this year won 700 bags of "Mercer" from the same field which gave him only 500 bags of "Hickory King" last year, although this has been in many respects an unfavourable season.

Mr. Mercer uses 200 lb. of bone meal per acre per annum, and although the soil is light he has been able by this means to grow maize for twenty years in succession on the same lands; last year his average over thirty-two acres was sixteen muids per acre.

This breed is subject to the same peculiar brown spotting at the lower end of the grain which is so noticeable in much of the Natal-grown "Hickory King"; it is shown on some of the grains figured on the plate. Several farmers are under the impression that this is due to soil conditions, Mr. Mercer noting that it was much more prevalent in those seasons and on those portions of his farm on which he applied a heavy dressing of kraal manure. It has been stated that the heavier soils in the Ladysmith District do not produce the spotting to the same extent as do the lighter soils in the Camperdown District.



Ear and Cob of Mercer Maize.

Report on the Maize Exhibits at the Durban Show, July, 1911.

By JOSEPH BURTT-DAVY, F.L.S., Government Botanist.

GENERALLY speaking, the shelled maize exhibited at the recent Agricultural Show at Durban was of good size and quality, but it was characterized by lack of uniformity in size and shape, which injuriously affects the quality and indicates that the yield was not as good as would have been the case had all of the grain been equal to the best.

This defect is due to failure to select along definite lines, and is one which might easily be remedied. The climate of part of Natal, especially the Cato Ridge, Camperdown, and Richmond districts, is perhaps unequalled for maize growing in any part of British South Africa, if we except certain areas in Basutoland, Swaziland, and Rhodesia. This being the case, Natal maize growers should not rest content until they produce the finest maize in the world. They have some excellent material to work with, now well acclimatized and ready for the breeder.

Apart from the defect just noted, there is a marked improvement in the quality of the maize exhibited this year; and it is especially noticeable in the charact^r of the selected seed ears. Much more can be done, however, to bring them up to standard. It should be borne in mind that the full results of selection can not be seen in the first or even in the second generation following.

The ears exhibited emphasize the lack of uniformity already referred to; there was not a uniform sample of ten ears in the whole collection. If five ears out of an exhibit of ten are of uniformly good quality there is no reason why the remainder should not be equally good. The potential quality is there; it only needs persistent continuity in the selection of seed to obtain the desired result. Inquiry among Natal maize growers shows that as a rule their maize has suffered largely through lack of this continuity of policy, and from selecting too much for length of ear and size of grain at the expense of uniformity in the quality of the grain.

It was found that the grain of many ears measured $\frac{5}{8}$ inch in length, and in some cases $\frac{11}{16}$ of an inch was obtained, but a $\frac{3}{4}$-inch grain is an ideal to work towards; it has been secured by American growers and should be equally possible in Natal. In eight-row "Hickory King" this may not be practicable, but with the ten and twelve row types and with "North American", "Ladysmith", "Boone County", and "Natal Yellow Horsetooth" there is no reason why it should not be attained.

There is a distinct brown mark on much of the grain, which should be bred out. Some farmers think that it always accompanies deep grain; observation of a large number of samples shows, however, that while it is true that it is usually found on deep grain, there is a good deal of deep grain from which it is absent, therefore the two characters are not necessarily correlated. Others think that it is due to soil, but in the same bag of grain harvested from the same field are found both stained and unstained grains; so that this explanation does not seem altogether satisfactory. By selecting deep grain without a brown stain it will probably be possible to breed a strain free from it.

A study of the awards shows that in many cases the same exhibitors who won at Maritzburg won at Durban also, indicating that the judging in both cases was consistent. At Camperdown, also, with different judges, the same men were large winners. The difference in awards for ears and for shelled grain is due to the lack of uniformity already referred to. The grower of the best shelled maize ought, also, to produce the best ears, and this was the case with Mr. W. B. Bosse, who took two firsts with his Natal White Horsetooth. Mr. W. C. Meyer was highly commended in Hickory King grain, and took third prize in ears. On the other hand, the winners of first and second in Hickory King grain did not secure anything in the class for Hickory King ears, owing to lack of proper selection.

The winners of the first and commended in Hickory King ears did not gain anything in grain, although proper selection of ears improves the quality of the grain. Lest a wrong conclusion should be drawn, it is well to point out that careful selection has only just been started and has not had time to show full results; that if the producers of the best grain had selected their best ears they might have beaten those winning first and second in ears; also that the winners of first and second in ears appear to have picked the very best ears from a comparatively poor crop.

Wetness of Exhibits.

The season has been unusually late, with the result that it was difficult for maize growers to exhibit a dry sample, especially in Natal White Horsetooth. I have been criticized for giving first prize to wet maize. I did this with full knowledge of the fact, partly because of the lateness of the season and partly because maize exhibited at an agricultural show is judged for quality rather than for condition. It does not need an agricultural show or an expert judge to decide whether the exhibit is wet or dry; any one can tell that. To have exhibits of only perfectly dry maize all agricultural shows at which maize is a feature would have to be postponed till August. To exclude damp maize is to give an unfair advantage to a man who happens to have a particularly dry farm or to farm in a particularly early district. Natal White Horsetooth, one of the best yielding breeds of maize grown in Natal, is characterized by its late maturity, large cob, and slow-drying habit; to exclude damp maize is to discourage the cultivation of this valuable breed.

In judging by points an experienced judge need not take the points of all the exhibits. He first discards those which are obviously outclassed, then he judges the remainder by points.

LIST OF AWARDS.

Class 142. Hickory King.—Three muids shelled maize (including butts and tips) and one bag of ears. Nine entries. First prize, £5; second prize, £2. Quality good in all cases.

First.—No. 619. John Marwick.
Second.—No. 621. Drimie & Co.
Highly Commended.—No. 618. W. C. Meyer.
Commended.—No. 620. W. Lumley.

No. 628, W. Pepworth, was also an excellent exhibit.

Class 143. Yellow Dent.—Three muids shelled maize (including butts and tips) and one bag of ears. One entry. First prize, £5; second prize, £2. Quality not up to standard.

No first prize award.
No. 627. John Marwick.

Class 144.—White, any variety (to be named with entry), ten ears, half to be shelled on the show and tested in judging. Special prize, ½ ton Dissolved Bone Compound. Eleven entries.

First.—No. 629. W. B. Bosse (Natal White Horsetooth).
Highly Commended.—No. 634. W. Mercer (Hickory King x Virginia Horsetooth).*
Commended.—No. 636. M. Geerdts (Louisiana, 10-row).

Both 629 and 634 were excellent samples. No. 629 gave an average yield of grain per ear of 18.9 oz.; the shape, size, and thickness of the grain were excellent, but the sample was very wet, although the ears had been gathered ten days before the show. Allowing for a difference of 20 per cent. in moisture as compared with No. 634, there is still about 1 oz. more grain per ear.

Mr. Mercer's crossbred is an excellent sample, much drier than No. 629, but averaging only 14.2 oz. of grain per ear.

Class 145.—Yellow, any variety (must be named with entry), ten ears, half the ears to be shelled on the show and tested in judging. Nine entries. Prize, ½ ton Dissolved Bone Compound.

First.—No. 641. W. C. Meyer (Yellow Horsetooth).

All the exhibits were poor. The best ears as regards shape, rows, and purity of breed were the Eurekas of Mr. M. Geerdts, but the grain was poor for Eureka. Mr. F. C. Robinson exhibited a fair sample of 8-row Yellow Flint, but this breed cannot compare with a good dent in quality or yield in districts suited to dent breeds. Of the Yellow Horsetooths, Mr. W. B. Bosse exhibited the largest and best looking ears, but the grain lacked depth and uniformity.

Class 146. Hickory King.—Ten ears, grown with Fison's Fertilizer. Half the ears to be shelled and weighed by the judge. Points to be given in conformity with other maize classes of the show. Prize, 1 ton of Fison's Special Mealie Fertilizer.

	Points.	Average, oz. grain per ear.
First.—No. 648. W. C. Meyer...	78	11.3
Second.—No. 652. W. Pepworth	76.5	10.8
Highly Commended.—No. 649. John Marwick	75	9.75
Commended.—No. 651. Archibald & Co. ...	73	10.35
No. 653. W. Lumley	69	10.9
No. 650. M. Geerdts	64.5	10.9
		64.0

Mean weight of grain, 10.66 oz. per ear.

* I.e. "North American."

No. 650 is a good Louisiana type, but should not have been entered in competition with true 8-row Hickory King.

Class 174. Hickory King.—Ten ears. First prize, £4; second, £2; third, £1. Twenty-one entries.

	Points.
First.—No. 761. W. T. Quested	76½
Second.—No. 748 W. B. Bosse	75
Third.—No. 749. W. C. Meyer	72
Highly Commended.—No. 755. H. Baker...	69
Commended.—No. 765. Archibald & Co. (disqualified for red cob)	69

No. 761.—Ears 8½ to 10 inches long; grain rough, wedge-shaped, of larger size and more even quality than in No. 748; the largest grains 5/16 in. long and wide. Exhibit uneven and rows irregular.

No. 748.—Ears 9½ to 10 inches long; rows fairly even and straight; grains not as well shouldered, and less uniform than in No. 761; too shallow for their width; the largest 9/16 in. deep, by ⅝ in. wide.

No. 749.—Ears 8½ to 9½ in. long; circumference of good proportion; rows fairly straight; grain fairly uniform in size but not in shape, too square; largest grains ⅝ in. long and wide.

No. 755.—Ears 8½ to 10½ in. long; rows fairly straight and regular; sulci too wide; grain uneven and on the average rather small in size; largest grains too shallow for their width; 9/16 in. long and ⅝ in. wide.

No. 765.—Ears 8½ to 10 in. long, rather slender, the rows too twisted and irregular; grain fairly even and of good colour, but rather thin, the largest 9/16 in. long, ⅝ in. wide.

		Average yield of grain per ear. Oz.	Weight of grain per bushel. Lb.
No. 748	W. B. Bosse	11.95	54½
,, 749	W. C. Meyer...	11.70	55
,, 750	J. Marwick	9.90	58½ {Grain very small.
,, 751	T. L. Fyvie	10.50	56
,, 752	,, ...	9.95	55¼
,, 753	No exhibit	—	—
,, 754	Drimie & Co.	10.80	—
,, 755	H. Baker	11.25	56
,, 756	No exhibit	—	—
,, 757	J. Adam, jun.	8.95	—
,, 758	No exhibit	—	—
,, 759	G. O. Pinkney	9.55	—
,, 760	W. T. Quested	9.55	—
,, 761	W. T. Quested	10.80	55¼
,, 762	No exhibit	—	—
,, 763	No exhibit	—	—
,, 764	M. Geerdts	9.65	—
,, 765	Archibald & Co.... ...	10.55	—
,, 766	W. Pepworth	10.85	—
,, 767	W. Lumley	10.50	57
,, 768	No exhibit	—	—
		156.85	447½
	Mean	10.45	56

Points.	761	748	749	755	765
	Entry numbers				
Uniformity of exhibit	5	4.5	2.5	0	2.5
Kernel uniformity	4	3	4	4	2
Kernel shape and length ...	10	7.5	6	6.5	7.5
Yield of grain per ear	7.5	10	9.5	8.5	7
	26.5	25	22	19	19

Class 175. Natal White Horsetooth.—Ten ears. First prize, £2; second, £1. Seven entries.

	Points.
First.—No. 769. W. B. Bosse	79
Second.—No. 774. J. W. Flett	70½
Highly Commended.—No. 775. Archibald & Co. ...	63

No. 769.—Exhibit fairly uniform; rows, twelve to fourteen, straight; ears, 11 to 12 in. long, 8¼ to 9 in. circumference at butt, 7½ to 8¼ at tip; grain rather uneven in shape, 9/16 to ⅝ in. long, ¼ to ⅜ in. wide. Average yield of grain, 19.7 oz. per ear.

No. 774.—Exhibit uneven · rows, fourteen, twisted and irregular; ears, 10 to 11½ in. long; grain uneven, ½ to 9/16 in. long and wide, ¼ in. thick. Average yield of grain, 18 oz. per ear.

No. 775.—Ears slender, fairly even, 10 in. long. Average yield of grain, 15.55 oz. per ear.

Class 176. White Pearl.—Ten ears. First prize, £2; second, £1. Two entries.

First.—No. 776. John Marwick.

No second award.

Class 177. Boone County.—Ten ears. First prize, £2; second, £1. Two entries.

First.—No. 779. Archibald & Co.

Second.—No. 778. J. W. Flett.

Class 178. Any other variety white flat. Varieties to be named with entry.—First prize, £2; second, £1. Nine entries.

First.—No. 786. W. Mercer (Hickory King x Virginia Horsetooth).

Second.—No. 782. Drimie & Co. (Hickory King crossbred).

Highly Commended.—No. 780. W. S. Flack (Horsetooth x Hickory King).

Commended.—No. 783. H. Baker (North American Horsetooth).

Among the other exhibits were Ladysmith, exhibited by John Marwick and Walter Pepworth, and Iowa Silvermine from M. Geerdts.

Nos. 784 and 785 were entered as Louisiana, but were not that breed; they resemble the "Mazoe" from Rhodesia, now being grown in Swaziland, which is probably a cross between Natal White Horsetooth and Hickory King.

Class 179. Any other variety of white round.—First prize, £2; second, £1. No award was made, as the single entry was a *flat* (labelled Hickory-Horsetooth), and therefore in the wrong class.

Class 180. Golden Beauty.—Ten ears. First prize, £2; second, £1. Three entries.

First.—No. 790. W. B. Bosse.

A good exhibit, with deep grain of splendid colour. The ears lack uniformity, but are of excellent length, and have regular, straight rows.

No second award.

Class 181. Eight-row Yellow Flint.—Ten ears. First prize, £2; second, £1. Nine entries.

First.—No. 794. F. C. Robinson.

The quality was so much below standard that no second prize could be awarded. The quality can be greatly improved by selection and by the use of improved seed grown in the Transvaal. The flint breeds are useful where dents cannot be grown profitably, but are usually considered not worth growing where dents can be grown instead.

Class 182. Yellow Horsetooth.—Ten ears. First prize, £2; second, £1. Nine entries.

First.—No. 803. W. B. Bosse.

Second.—No. 804. W. C. Meyer.

None were quite up to standard. This breed has the making of a useful type by careful breeding and selection for the following points:—

(1) Uniformly deep, wedge-shaped grain, with straight sides.

(2) Uniformly dark yellow grain.

(3) Red cobs.

In many cases the ears are much too short and tapering and the colour is much too pale. The result of selecting uniformly dark yellow grain will probably not be apparent the first season. If selection is persistently followed in one direction, however, an improvement should be noticeable the second year, and a much greater and more rapid improvement during succeeding years, until a uniform type is established.

Class 183. Golden King.—Ten ears. First prize, £2; second, £1. Two entries.

First.—No. 811. W. B. Bosse.

The second entry (812) was disqualified, being Yellow Horsetooth and not Golden King. No. 811 was criticized by some exhibitors as not true Golden King, on account of some ears having red cobs. Although this breed usually has a white cob, this is not an essential feature, but is, rather, a defect which should be bred out. The low feeding value and poor quality of Golden King are against this breed, but if it is retained the development of a red cob, by breeding, is desirable.

Class 184. Any other yellow flat breed.—First prize, £2; second, £1. Four entries, none of them up to standard.

First prize.—No award.

Second prize.—No. 815. M. Geerdts (Eureka); ears fair, but grain poor in quality.

No. 813, " Baker's Success ", a strain of Yellow Horsetooth, may develop into a distinct breed by careful and persistent selection.

No. 186, " Victoria Wonder ", is a " round " flint, and should have been entered in class 185. It is a cross between a yellow flint

and a white flint, of wonderfully varied hue, but of no commercial value unless bred true to colour; commercially it would be graded as " mixed ". This defect could easily be bred out.

Class 185. Any other variety yellow round.—First prize, £2; second, £1. Only one entry, No. 817; quality poor; awarded second prize. Called " Bright Yellow ".

Names and addresses of successful exhibitors.

The following exhibitors were awarded prizes or commendation:

Adam, Jas., jun., The Wolds, Kokstad.—Yellow Flint.

Archibald & Co., Umzinto.—Hickory King, White Horsetooth, Boone County.

Bosse, W. B., Richmond.—White Horsetooth, Yellow Horsetooth, Hickory King, Golden Beauty, Golden King.

Baker, H., Umlaas Road, Maritzburg.—Hickory King, North American Horsetooth, Baker's Success.

Drimie & Co., Inchanga, Umgeni.—Hickory King.

Flack, W. S., Fair View, Spring Vale, via Ixopo.—Hickory King x Horsetooth.

Flett, J. W., Richmond.—White Horsetooth, Boone County.

Geerdts, M., Withoek, P.O. Schapenrust (Transvaal).—Hickory King, Eureka, Louisiana, Iowa Silvermine.

Lumley, M., Umlaas Road, Maritzburg.—Hickory King.

Marwick, J., Ward Hill, Richmond.—Hickory King, Yellow Horsetooth, Ladysmith.

Mercer, W., Cato Ridge.—Hickory King x Virginia Horsetooth.

Meyer, W. C., Harrison.—Hickory King, Yellow Horsetooth.

Pepworth, W., Rietfontein, Pepworth Station, Klipriver District.—Hickory King, Ladysmith.

Quested, W. T., Woodcote, Elandslaagte, Klip River.—Hickory King.

Robinson, F. C., The Heights, Estcourt, Weenen Co.—Eight-row Yellow Flint.

Preparation of Wool for the Market.

By C. Mallinson, Flockmaster and Wool Expert (Transvaal).

Wool production and the profitable rearing of sheep are industries so intimately connected with the commercial welfare of South Africa that it seems to me to be incumbent upon those having the advantage of many years' experience in the trade to further in every way in their power the development and improvement of the Transvaal flocks by imparting the results of such experience to those directly concerned in sheep raising. I am writing mainly with the object of giving a word of encouragement and advice to the smaller farmers, who are far in the majority in this country, and, consequently, a good deal I have to say may appear to some an unnecessary repetition of the A B C of their business. I am confident, however, that to many who may consider themselves well grounded in the details of sheep farming, it may yet be distinctly advantageous to carefully read and digest the conclusions arrived at on matters essential to the successful conduct of wool growing.

Casual inspection of wool show-rooms on almost any sale day will readily convince the visitor that I am not unjustly decrying the quality of a large proportion of the main-staple in this Province in describing it as poor to medium only. That there should not be occasion for such unfavourable comment cannot, I think, be gainsaid when the special suitability of so great an area of the Transvaal for the production of a fairly superior type of merino wool is taken into account. Individual effort on the part of every farmer can alone remedy this undesirable state of affairs, and it is within the power of every wool grower by steadily, if slowly, increasing the weight (this does not mean excessive yolk or foreign matter) of his fleeces and improving the general type of his flock to further establish the reputation lately earned by South African wools on the world's markets. Every ounce added to the average weight of a clip, and every farthing gained in the average price, may be regarded almost entirely as direct profit on the year's working, so small a difference is there between the cost of tending a high class and low class flock.

To many readers of this article it will no doubt be somewhat of a surprise to learn that an extra penny per lb. over the wool grown in the Transvaal alone would, taking the weight of 9,730,587 lb. produced in the Province for the twelve months ended 30th June, 1910, amount to no less than £40,544. 2s. 3d., and if to that be added a theoretical gain of only one pound per head over the 2,019,614 woolly sheep of the Province at the average price of, say, 6d. per lb., there would be an additional £50,490. 2s., or a total of £91,034. 4s. 3d., to place to the credit of farmers in excess of the gross sum actually realized for the year's clip.

It is my object, therefore, to compile in concise form a series of suggestions and hints which would be of service to a wool grower in enabling him to make the utmost of such opportunities as may be

available to him in respect to the shearing of his sheep and the preparation of the wool for the market. The season is approaching fast when every farmer will be shearing his sheep, and I can imagine no better time to offer an article of this nature. Shearing time is the time when every sheep-breeder harvests the fruit of his work for the whole long year, and nobody can administer too much care to obtain the best results for his year's labour.

GENERAL.

My intention is to give a brief treatise on the getting up of an average South African clip of, say, up to thirty bales in such a way as to attract the greatest attention from buyers. For this purpose I must necessarily enter into a few side issues pertaining to my subject to demonstrate more plainly to readers what I really intend to convey to their minds.

First of all, then, one requires a fairly high class and uniform flock to produce good, even, and attractive wool. This could only be obtained by judicious selection, i.e. breeding from the best of your stock and rejecting from the breeding ewes all inferior and faulty ewes. This is one, if not the most, important factor in successful sheep-breeding. The action of rejecting inferior sheep from the general flock is known by the term of "culling".

I cannot here even attempt to enter fully into the question of culling, but can at least offer a few recommendations for general guidance.

Firstly, then, grown sheep should be classed in the wool just before shearing. Be careful not to cull either for frame alone or for wool alone. Let the happy medium be hit upon and adhered to, and gradually the eye and hand, working in intelligent sympathy, will tell you with seldom failing accuracy by the "look" of the animal and the "grip" of its wool whether the particular sheep has to be more carefully examined for possible rejection. Be especially careful in culling the breeding flock to distinguish between "wet" and "dry" ewes. Perchance that rather feeble sheep there is the mother of a sturdy lamb, and, therefore, a better payer, all things considered, than that broad-backed, well-fleeced ewe whose udder on examination proves she has brought none but herself to the yard to add to the year's returns. In culling, as a whole, always take carefully into account the season the sheep have just passed through. It is a common saying, but a very true one, that a good deal of breeding goes in at the mouth. Accept as your guiding principle always "the survival of the fittest". Make provision for sufficient nutritious feed for your sheep both during the summer and winter months to develop the very best that is in them and keep up their constitution. Starvation and impure water will not only bring down the constitution of even the best sheep, but also affect their wool-producing properties to a remarkable extent.

SHEARING AND PREPARATION OF WOOL FOR THE MARKET.

Now I come to the point I had in view with this article, namely, "the shearing and preparation of the wool for the market".

The operation of shearing calls for a few remarks from me, and I think the following essentials could be profitably taken to heart by my farmer friends concerned in sheep-breeding.

SHEARING.

(*a*) Proper accommodation should be provided in which to carry on the work of shearing. There should be ample space for every shearer to carry on the operation conveniently and to spread out the fleece as he goes along, and enough light to allow the work to be comfortably done. The floor or shearing-board should preferably be of wood, but any other hard material would do. It should be kept scrupulously clean and free from foreign matter and swept—after every sheep shorn—and the fleece picked up before the shearer starts on his next sheep.

(*b*) The catching pens should also be kept clean. The farmer should make it a point to keep the dust down in every possible way. The abominable practice of mustering the whole mob of sheep near the shed (or the poor substitute for a shed that is too often found in the country) and filling the catching pens by catching the sheep one by one should be dispensed with. It not only does the sheep terrible harm, but also spoils the whole clip.

(*c*) Sheep should, under ordinary circumstances, never be shorn until the wool is of twelve months' growth. They should be perfectly dry at the time of shearing.

(*d*) When a shearer is selecting his sheep he intends to shear, it is most important that he should carry the sheep from the catching pen to the shearing floor and place it on its rump. This plan does away with that cruel method of dragging the sheep from the catching pen by the hind leg. The belly should then be shorn off and detached from the fleece and placed behind the shearer so that the boy picking up the bellies can see it and put it into the basket placed on the board for that purpose.

The shearer, after having removed the belly-wool, should then clean the sheep between the hind legs. The left leg should then be shorn as far as the britch. The next thing is to take off the fleece in one piece. The shearer should start on the right side of the neck at the point of the brisket and shear in a straight line to the right ear. The wool should not be cut but broken through with an outward movement of the arm. Second cuts should be avoided as much as possible. The shearer should shear from right to left. All cuts should be dressed with some kind of disinfectant before the sheep is let go. It is desirable that the sheep should not be branded with tar or paint.

PICKING UP AND ROLLING.

The fleece after having been taken off the sheep's back should be carefully picked up by gripping the two britches, one in each hand, and gathering in the rest of the fleece by an inward sweep of each arm. By retaining hold of the two britches and throwing the rest of the fleece gently away from him, the picker up should be able to spread it neatly, staple side up, and flesh side down on the table, without causing any break in it.

The wool roller, who in the Transvaal is often at the same time picker up, having the fleece before him, should first gently shake it so as to detach any second cuts or fribs. His next duty is to take off all dirty points, any inferior parts of the fleece, all foreign matter in the shape of grass seeds or burrs, etc. After the fleece has been skirted, i.e. all the dirty points and locks and wool which have been

stained by manure and urine, taken off, it should be rolled in the following way: Throw over the one side so as to double the fleece, then throw in the neck, then the britch, turn in the sides and pull over the back, then start rolling from the britch up to the shoulder. This way of rolling will expose the best part of the fleece and help the buyer to come to the correct value of the clip. This done the fleece should be passed over to the wool classer's table. The classer then, according to quality, places the wool in the different bins set apart for that purpose in any properly equipped wool shed.

CLASSING.

The term "wool classing" is generally applied to the work carried on at the farm during shearing time when the wool is being prepared for the market. "Wool sorting" refers to the work done at wool warehouses and factories where all the fleeces of an uneven quality are broken up and divided into the different qualities.

The object of classing is to get up the wool in such a way as to make it attractive. In order to obtain the best results the classing must be done skilfully, honestly, and last, but not least, very carefully. All trouble and skill will amount to nothing if the work is not done scrupulously clean and carefully. The wool must be classed in such a way that the requirements of the different sections of buyers, who are the representatives of manufacturers, are complied with. For instance, "Combers" want a combing wool, i.e. a wool with a fair length of staple and elasticity, and sound enough to stand a reasonable amount of tension. "Carders", on the other hand, are satisfied to buy the shorter and more tender, or "clothing" wool, while American buyers, on account of the heavy import duty (11 cents = 5½d. per lb.), can only afford to buy absolutely the lightest and best yielding wools so as to pay duty on as little dirt as possible. Some buyers look for fine wool, while others must have coarser qualities to suit the factories they are buying for.

All wool is valued by the buyer on the basis of the clean weight it will produce when scoured and ready for use. Suppose the clean value is 2s. per lb., the greasy value should be in proportion to the yield as per following table:—

If yielding	55%	48%	42%	36%
the greasy value would be ...	13d.	11½d.	10d.	8½d.
Add United States import duty	5½d.	5½d.	5½d.	5½d.
Cost greasy pound in America	18½d.	17d.	15½d.	14d.
Cost clean pound in America	33¾d.	35½d.	37d.	39d.

The classer should be conversant with the requirements of the trade and do his work honestly and carefully if the farmer is to receive the full benefit of his clip. It stands to reason that a properly got up clip will inspire buyers with confidence, which means better competition and still better prices. To attain this object too much care cannot be taken. The buyer must be able to fix the price on the wool with a minimum amount of trouble. This is impossible for him to do unless the wool is classed in such a manner that the contents of a bale are more or less uniform, of the same character, quality, and marketable value. This done, it is an easy matter for the

competent woolman to make up a true estimate of a lot or lots and to cut his prices very fine. If this is not the case and the bale filled indiscriminately as to condition and quality, it is impossible for any expert, be he as clever as can be, to make a reliable valuation. He can only estimate roughly what proportion of good and bad wool are in the bale, and consequently only fix a nominal price for same, in which case he always leaves a fair margin to be on the safe side in the event of miscalculation.

It will be quite clear to everybody, after the above explanation, why wool, even a clip of 1000 to 2000 fleeces, should be systematically skirted and carefully classed. Dealing with this matter it is comparatively simple to class a big *clip*, but not so when you only have a few bales at your disposal. In the first case the classer is justified in dividing the wool into as many classes as he considers necessary to maintain the proper standard for the different qualities, while in a clip of 1000 to 2000 fleeces discretion and sound judgment are required to make a nominal standard so as to prevent too many small lots, which as a rule are often neglected by the great bulk of the buyers.

A SMALL CLIP.

A small clip of, say, from 300 to 500 fleeces does not require much classing. All that is required is that all the lightest conditioned, most bright and attractive fleeces be placed into the top or first lot, while the second sort is constituted of all the heavier conditioned, duller, and less attractive ones. Any very discoloured and inferior fleeces would be better broken up amongst the skirtings.

Dealing with the skirtings, or pieces, it is advisable to sort these into first and second pieces. The first pieces should consist of all the biggest and cleanest wool; the second pieces of all the dirty edges or trimmings from the firsts. This should be done on a table set apart for that purpose. It is impossible to lay down a hard and fast rule for skirting fleeces as everything depends on the merits of the fleece spread on the table. Where there are no burrs or excessive grass seeds, the skirtings should be as light as possible. It is not advisable to skirt too heavily. Much harm is sometimes done by over-skirting, that is, by taking off too much wool from a fleece.

The belly-wool should also be carefully trimmed and all stains and fatty bits removed and packed separately.

STAINED WOOL.

I would specially suggest the keeping of the stained parts by themselves, because the mixing of the good white wool with the discoloured at once reduces the value of the former to anything from 1d. to 2d. per lb. Any one with a practical knowledge of the trade will see the force of this statement, for they know all stains have to be dyed at one stage or another, while if it is white it can go straight away to be combed into a clean top. Whereas if the white wool is mixed with the faulty parts, it is only fit for producing a discoloured top, which can only be dyed into darker shades, while if the top is of good colour it could be dyed into any light shade that may be required. The same thing applies to the woollen as well as to the worsted trade.

LOCKS.

Locks consist of second cuts and fribs that fall through the wool tables during the processes of wool rolling and piece sorting, as well as the locks swept from the shearing floor. There is a marked difference between the table locks and the sweepings from the shearing floor. The first named are much cleaner and lighter than the last, and if the quantity permits should be baled separately. Otherwise, only one line must be made. Care should be taken to run the sweepings over a fine-wire screen so as to remove as much dirt and foreign matter as possible.

WOOL TABLE.

Of course to be able to treat a clip properly, a good wool shed with proper light and rolling tables are absolutely indispensible. The best way to construct a rolling table is to make a frame 4 ft. 6 in. broad by 9 ft. long of 6 by 1 inch boards, supported by legs of 2 ft. 8 in. high, made from timber 4 in. by 3 in., and covered with 1-in. wooden battens, 1 in. apart from one another, the edges of which should be smoothed and rounded off on top so as to allow all second cuts and locks to drop through and prevent the wool being caught and the fleeces torn to pieces.

PRESSING.

Every farmer should possess a wool press. Too much importance cannot be attached to the general appearance of the bales as well as the wool. The neatness and outward appearance of a bale shows some indication of a certain amount of care and attention having been paid in this direction. I might also mention, in the matter of transport from the interior to the coast, more bales properly pressed could be carried in one truck. This also applies to shipping, unless the wool is dumped. It is consequently a saving of money during transit.

BRANDING.

It is advisable to brand the wool bales with clear, stout letters on one of the sides and on the bottom. On the side the following details should appear: (1) The name or distinguishing mark of the owner (2) with the name of the farm or district beneath it; (3) then follows the class of the wool and (4) the number of the bale.

And on the end (1) the owner's mark, (2) name of the farm or district, and number of the bale, as follows:—

On the flat side of the bale:

D.O.A.
Ermelo.
A A
Combing.
1.

On the end of the bale:

D.O.A.
Ermelo.
1.

In conclusion, I say emphatically that it does pay, and pays well, to get up a clip properly. When there is carelessness shown the value of the wool will always suffer. No man is going to pay for carelessness, and I would like to emphasize that fact both upon small and large growers alike.

It is very plain to be seen that a clip which at first sight appears to be smart and well got up will at once receive the full attention of a buyer. When valuing he will look carefully at the wool and not place a sporting valuation on same, whereas if a clip appears wanting and there is a mixture of bellies and pieces along with the combing wool, it will be valued at a price that is in harmony with the allowance which must afterwards be made for such wool.

There can be no deceiving a buyer on this head. He knows that contingencies arise such as increased shrinkage when the heavier parts have been rolled in good combing wool.

Farmers should read this article very carefully and try to follow out the suggestions made, and they will soon find out that it means to them a considerable improvement in their banking account.

The Date Palm.

By O. R. Coley, Upington, Cape Province.

An article appeared in the June number of the *Agricultural Journal*, by the Government Horticulturist (Cape), on the date palm, describing its value as a fruit producer, and if heat, dryness of atmosphere, and sand are conditions conducive to the production of luscious fruit—and, if planted in groves, bounteous shade—then there should certainly be many parts of this country suitable for its cultivation. If the Sahara, why not the Kalahari and other parts? As a preliminary to opening up the Kalahari, groves of these palms might be planted at all the water holes—beacons in the desert—and by their shade and attraction, act as conservers of the water.

But fruit is not the only product to be obtained from this valuable and ornamental palm. Given a fairly humid and warm atmosphere, and moist surroundings, it will yield an abundance of sap, which can be converted into excellent sugar, considered by some to be superior to the produce of the cane. The sap is also a wholesome beverage when freshly drawn from the tree; if allowed to ferment, it becomes an intoxicant. The sediment from the liquor is used as yeast, lending a particularly pleasant flavour to the bread. The leaves from the branches, which have annually to be pruned off to allow the sap to be tapped, are very largely used for making matting, and for bags, such as sugar and date bags. When the trees are too old and worn out, they can be cut down, split down the middle, and used as roofing beams and rafters, in which capacity they will last many years.

We cannot, however, expect too much from the tree, and if the tree is tapped and the sap withdrawn the fruit will naturally suffer. At least, I have never known edible fruit to be borne by a tree that has undergone this process, nor, I may add, that has been grown in a moist climate.

The seedlings are planted out when about a year old, about ten feet or more apart, either round the boundaries of fields, so as to save ground, or, if as a plantation, then in rows, ten feet apart and about fifteen feet between the rows. The land should be well cultivated, and, during the first few years, kept in condition by cropping. If irrigation is resorted to for the crops, care should be taken to do this wisely, and avoid flooding.

The trees are fit for tapping, though not full grown, in their seventh year. It is a mistake to tap them earlier, as it only weakens the tree, and the return is small.

Tapping.—Shinning up a palm tree is an art, and can only be acquired after some practice. All palm trees are not smooth. The date palm is one of the exceptions. A strong strap, passing loosely round the tree and the body of the climber, a short loop strap connecting the climber's feet, a sharp knife made for the purpose, and a light metal pot with a string (earthen pots are too apt to break, otherwise they are better) are all that is required. The rest is done by practice.

A light bamboo ladder might be used whilst the tree is young, but after that the former method is the speediest and safest. Having reached the crown of the tree, the lower branches should be cut away to about a foot in height. A triangular piece of bark is then removed, one angle being at the base. The part thus laid bare is then slashed. so that the sap may run down to the bottom angle. A leaf is then inserted as a guide, or spout, and the pot tied to the tree immediately under the spout. Every morning the pot must be emptied and refastened to its place. The cutting and slashing operation has to be repeated during the continuance of the season, as soon as the flow of sap decreases, caused by the wound healing up. The season for tapping is during the cold weather. The following year this process is repeated on the opposite side of the tree, the branches being cut away and a fresh opening made, the old cut having been allowed to heal up. And so on, year after year, until the tree is played out, which will be in about twenty-five years.

Sugar.—The sap thus collected is at once poured into large, shallow, iron pans, a little at a time, and allowed to boil slowly, being stirred the while, and, as the water evaporates, more sap is poured in until the pan becomes full, and the contents of the right consistency. It is then placed in another receptacle and briskly stirred until it granulates. It can then be put on the market or sent to a refinery or refined on the spot. The yield of sugar is about 150 to 200 pockets, or, say, five tons or more per acre, of, say, 300 trees, according to the season.

"Black Scab" or "Warty Disease" of the Potato.

By I. B. Pole Evans, M.A., B.Sc., F.L.S.

The object of the present note is to afford potato growers in South Africa some information regarding a disease of the potato prevalent in the British Isles and Germany, so that they may be on their guard against it should it appear either in imported "seed" or in the crops raised from the same.

The disease is commonly known as "Black Scab" or "Warty Disease". Its general appearance is shown in illustrations herewith. Warty disease was first noted in Upper Hungary in 1896, and very shortly afterwards it appeared in England, and it has now spread to Wales, Scotland, and Ireland. The disease is caused by a minute fungous parasite named botanically *Synchytrium endobioticum*, Perc.

All growing parts of the potato plant may be attacked by the fungus, but it is usually the tubers that are rendered most conspicuous as a result of the disease. They become covered over with wrinkled and warty excrescences, which may almost be as large or even larger than the tuber itself.

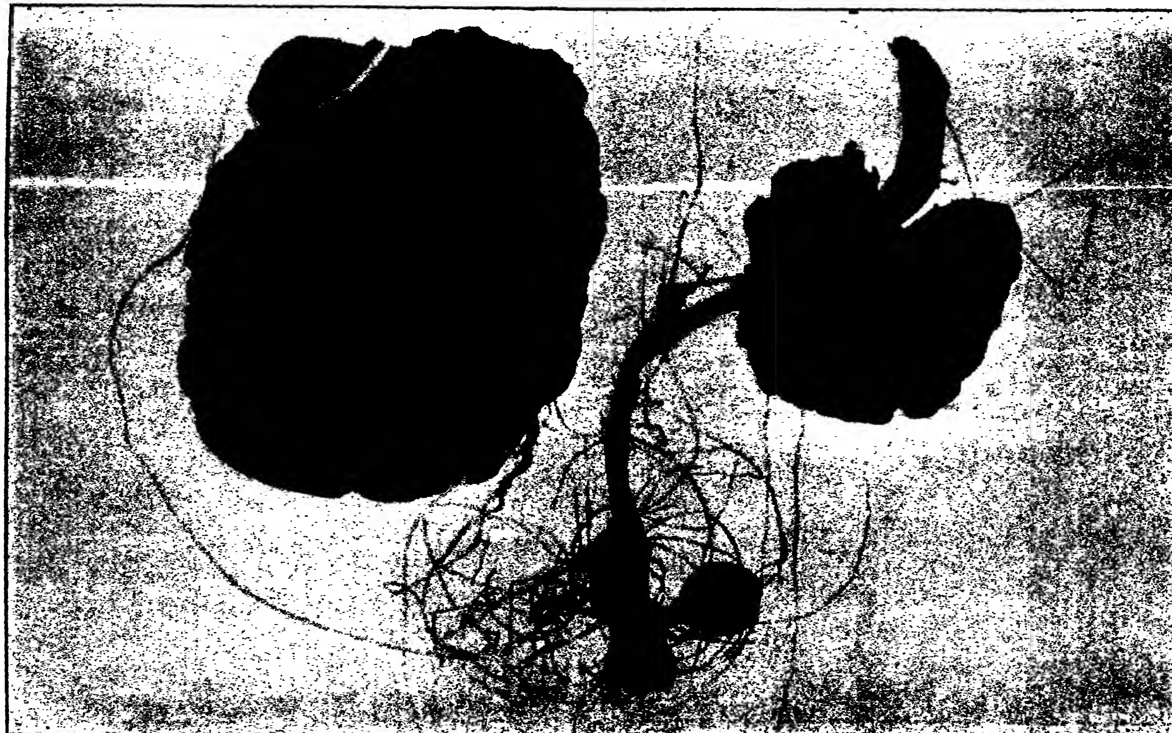
When the shoots above ground are affected, they not infrequently develop clusters of minute leafy outgrowths densely crowded together. Oftentimes there may be very little evidence of the disease beyond a slight discoloration or blackening of the "eyes" of the tubers, and as such tubers contain the germs of the fungus they are perhaps a greater source of danger to the farmer than more conspicuously affected "seed", since they are less liable to detection, and consequently more likely to be used for planting purposes. When the diseased potato rots, the surrounding soil becomes contaminated with the germs of the fungus, and it has been definitely proved that these germs in the ground, even after a two years' rest, are capable of infecting a crop in the third year. There is also some evidence to show that the germs may remain dormant in the soil for as long a period as six years, and then renew the disease.

Some varieties of potatoes are said to be more liable to the warty disease than others. British, Eldorado, Factor, Herd Laddie, Princess May, Kidney, Scottish Triumph, Up-to-date are stated to have suffered more or less severely, whereas Bashford Beauty, Clarke's Seedling, Lillie Langtry, Lord Tennyson, and Purple Perfection are reported to have exhibited decided immunity to the trouble.

Up to the present this pest has not been detected in South Africa, and it is against its introduction into this country that the farming population should be specially on the alert, and immediately forward any tubers suspected of the disease to the Agricultural Department for examination and report.

Owing to the prevalence and recent spread of warty disease in the British Isles and Germany, and with a view to preventing its introduction into the Union of South Africa along with imported "seed",

"Black Scab" or "Warty Disease" of the Potato.



Tuber and Potato-haulm affected with Black Scab or Warty Disease caused by *Synchytrium endobioticum*. Perc.

"Black Scab" or "Warty Disease" of the Potato.

Potato Tubers affected with Black Scab or Warty Disease caused by *Synchytrium endobioticum*. Perc.

no consignment of potatoes will be passed for admittance into the Union of South Africa unless (1) the consignee surrenders to the inspector a declaration from the consignor showing the country and local place of origin of the potatoes, giving data that establish the identity of the consignment, and declaring that to the best of his knowledge and belief the fungous disease known as black scab or warty disease (*Synchytrium endobioticum*, Percival) has not been known to occur on the farm or farms where the potatoes concerned were produced; and (2) except as herein provided, unless the consignee, if called upon to do so by the inspector, produces an official certificate from the Government Department of Agriculture of the country of origin, in which it is certified at a date not more than nine months previously that the department, shire, county, or other such territorial division in which is situated the place or places declared as being the source or sources where the potatoes were produced, is deemed by the Government to be entirely free of the said disease.

Notwithstanding anything to the contrary in this Regulation (3), consignments of potatoes will be admitted from any country without the official certificate aforementioned if the Government of the country in question gives an assurance to the Minister of Agriculture of the Union of South Africa that black scab has not been known to occur in that country, and further undertakes to advise that Minister of any outbreak of such disease. Should an outbreak occur an official certificate as above described will be required.

Some Poultry Diseases.

By R. Bourlay, Poultry Expert, Transvaal.

This is a subject in which there is a wide field for study, not only on the part of the poultry-keeper, but also by the bacteriologist, for there is no doubt that many of the troubles affecting poultry are of such a nature that they can only be definitely determined by the examination of blood smears under a microscope.

It is not our intention to deal with obscure blood diseases in poultry in this article, for that is a subject which is better left in the hands of those more versed in bacteriological research, but rather to deal with the more common and easily recognizable troubles with which every poultry-keeper has to contend at one time or another.

There is an old saying that "prevention is better than cure", and at the moment we cannot think of anything to which this applies more aptly than to the question of poultry diseases; that sickness can to a great extent be prevented in most poultry yards is an undoubted fact, but such a state of affairs can only be attained by experience, a careful study of the habits and requirements of the birds, and lastly, but by no means least, the use of common sense. It is seldom that one hears of serious outbreaks of disease in any of the large poultry yards in South Africa, for the reason that those in charge of such places have the benefit of knowledge and experience and take every precaution to prevent sickness amongst their stock; and the same may be said with regard to the yards owned by most fanciers, for, though their establishments may, owing to circumstances, be small, yet they have given much thought and attention to the subject, which with them in most cases is a paying hobby.

Anaemia, or poverty of blood, is a trouble frequently met with, especially in small establishments where the birds are confined in runs. The symptoms consist of loss of appetite, moping, and the face instead of being a bright red colour is pale or sallow. If the inside of the mouth be examined it will frequently be noticed that this also is pale and devoid of that bright colour found when birds are healthy.

The causes are usually due to overcrowding, insufficiently ventilated houses, unsuitable food, stale ground, and weak constitution on the part of the stock.

In the treatment of any disease it is essential that the cause shall be removed, and this applies to nearly all of the diseases mentioned below as well as in this case. We have found that an iron tonic is an excellent remedy in cases of anaemia. A few drops of tincture of iron placed in the drinking water daily is perhaps the simplest form, or else an iron pill given once daily is very little trouble, though perhaps rather more expensive.

Apoplexy.—This more frequently occurs during the summer, and especially in the warmer parts of South Africa. On the high veld where the heat does not rise to an abnormal temperature it is not

often met with, but on the low veld, or in towns where the birds are surrounded by houses and trees, and all breezes are shut off, it is of fairly frequent occurrence. Heavy breeds are more subject to apoplexy than the lighter varieties, chiefly owing to their heavier feathering and their greater liability to get over-fat.

The bird suddenly collapses, and when picked up is sometimes found to be dead; when, however, it is only insensible, the large vein under the wing should be opened and allowed to bleed freely. When it is considered that enough blood has been allowed to escape, the bleeding should be stopped, and when the bird has recovered sufficiently to be able to swallow, a purgative should be given—such as a dose of epsom salts—and the patient can then be placed in a cool dark place and fed sparingly on non-stimulating food for a few days.

Bronchitis usually occurs during damp or cold weather, especially after a sudden change. The symptoms are a rattle in the throat when breathing, frequently accompanied by a discharge from the nostrils. In such cases remove the bird to warm quarters and allow it to inhale the steam of hot water into which a few drops of carbolic acid have been poured; also five or six drops of brandy in a teaspoonful of milk may be given two or three times a day, and two or three drops of spirits of camphor in sweet oil once daily. As the bird recovers, an iron tonic is useful in assisting it to regain strength. If neglected, this disease may develop into pneumonia, though, on the other hand, we have seen birds with a slight attack of bronchitis recover after two or three weeks without undergoing any treatment.

Bumble-foot.—The growth of a corn on the sole of the foot. Heavy breeds are especially liable to this trouble, though birds of the lighter varieties are by no means exempt. It is most commonly found where poultry are kept in runs where the ground is hard, and is also frequently caused by fowls jumping from perches which are too high on to a hard floor.

In the early stages the paring of the corn with a sharp knife will occasionally prove effectual, but when the corn has attained any size it should, after being pared, be painted with iodine, salicylic acid, or acetic acid. The patient should be shut up in a roomy box or coop with plenty of soft litter on the floor, but should not be allowed to perch.

Advanced cases are very obstinate and difficult to cure, and unless the bird is of considerable value it is hardly worth the trouble. Cocks appear to be more subject to bumble-foot than hens, and are frequently rendered useless for breeding purposes when badly affected.

Catarrh.—Generally described as roupy colds. This disease is one which is frequently met with in South Africa, and in nearly every instance commences with a slight cold, due to either sleeping in a draughty house or roosting in an overcrowded house which is insufficiently ventilated. Also it is undoubtedly more common in birds which are constitutionally weak, for such stock are naturally more liable to contract any disease than birds that are constitutionally sound and strong. The first symptoms are usually indicated by a slight running of the nostrils, which is often accompanied by a watery-looking eye, which in some cases shows a little froth in the corner. When neglected these symptoms develop rapidly, and the discharge from the nostrils increases and becomes very offensive, the

beak being coated with slime; the eye becomes puffy and usually closes up, after which a swelling shows between the eye and the beak. In its early stages the cure is not very difficult, as in all cases isolation is the first step. The bird should be kept warm and dry, and the eyes and nostrils should be bathed every day in warm water containing a little permanganate of potash; a dose of epsom salts should be given, and five or six drops of spirits of camphor in a teaspoonful of water administered every night will be beneficial; the bird's head may be held over boiling water to which a little eucalyptus oil has been added.

All mucous matter should be squeezed out of the nostrils when the head is bathed, and a little boracic acid powder should be sprinkled on them. If the eye is closed up this must be gently opened and any mucous matter carefully washed away. If a growth is forming in the eye this should also be carefully removed, and a pinch of boracic acid powder sprinkled inside under the eyelids.

When a swelling has formed on the side of the face the contents can, if soft, frequently be squeezed out through the nostril by placing one finger inside the mouth against the roof and gently pressing upwards, whilst at the same time pressure is placed on the swelling externally. If, however, the lump is hard, it is necessary to lance it; this should be performed with a small sharp penknife; gently press the swelling on each side of the cut and a yellow cheesy substance will exude. If the growth is ripe it usually comes away in a solid mass, but, if not, as much should be removed as possible, and the wound will then have to be opened later. Wash well with disinfectant and apply boracic acid powder liberally to the inside of the sore.

Such advanced cases as mentioned above take a long time to cure, but when the disease is noticed in time and treatment applied it is only a matter of a few days before the birds are quite well again. Occasionally it will be found that a number of chickens have contracted this complaint. This usually occurs in very wet weather or after a sudden change, or sometimes, in the case of artificially-reared chickens which are still in the foster-mother, an outbreak will occur. This is usually due to the chickens being kept too warm in the brooder, i.e. insufficient ventilation, and in a case of this description it is wise to kill off at once those that are affected, and put some permanganate of potash in the drinking water, or the remainder will be liable to contract the disease.

When, however, the chickens are three or four months of age and indications of colds are noticed, the following condiment may be given with good effect:—Fenugreek, aniseed, ginger, and liquorice: equal parts of each well ground and mixed; one tablespoonful in soft food for each twenty-five birds.

In all cases where contagious diseases occur it is wise to add permanganate of potash to the drinking water of the healthy birds, in order to prevent the spread of the contagion.

Cholera.—This is probably the most rapid and fatal disease to which poultry are subject; further, it is highly contagious, and an outbreak may spread through the entire yard within the course of a few hours, for nothing is easier than for the infection to be carried from one place to another on one's boots.

We have only seen one outbreak of this disease and have only heard of two others which have been definitely determined as being

cholera. In two instances practically the whole stock of birds died; in the other the methods suggested by the late Lewis Wright in his admirable work on poultry-keeping were adopted, with the result that within three days the disease was stamped out, but not before some 100 birds had died.

The treatment advised by Wright consists of instant isolation, the careful disinfection of all the runs and droppings with a strong solution of carbolic acid, the addition of 20 grains of salicylic acid to every pint of drinking water, and the burning of every dead bird and all excreta.

An American writer strongly recommends vaccination of the healthy stock with a particle of dried blood taken from a diseased bird, and his evidence in support of this theory is certainly convincing.

The symptoms of cholera consist, in the earlier stages, of dullness, dragging of the legs as though the bird was suffering from cramp, feathers ruffled, eyes sunken, considerable thirst, accompanied by diarrhoea. These symptoms rapidly develop, and within a few hours the head will generally swell until the eyes are quite closed; the bird will hardly be able to walk; and the evacuations become white and frothy, very offensive, and frequently streaked with blood. These symptoms continue to increase in severity until eventually the bird is helpless and dies in convulsions.

Cramp.—Occasionally met with in fully grown poultry, but more frequently found in chickens which are confined in a room with a hard smooth floor, that causes muscular cramp owing to the feet always being in one position, which means that only certain muscles get the proper amount of exercise.

The obvious remedy is either to put broken rough soil on to the floor or to remove the chicks to a spot where the soil is rough and where they will be able to scratch and thus develop all the muscles as nature intends.

Crop-bound.—This is usually caused by an accumulation of dead grass in the crop, which gradually increases in size (for much of the food swallowed by the birds seems to be accumulated by the obstruction) until the crop becomes quite hard and distended, making it impossible for the fowl to swallow anything, and, if neglected, the bird will starve to death. In the earlier stages we have cured this by pouring small quantities of sweet oil down the throat and then gently working the crop with finger and thumb, but when this proves ineffective the only remaining course is to open the crop. A cut must first be made through the outer skin, which should then be drawn slightly to one side, and another incision is then made through the next skin into the crop itself, the finger inserted, and the contents gently removed; and at the same time it is wise to feel and ascertain that there is no obstruction in the passage leading from the crop to the gizzard.

After it is clean the crop should be well washed out with disinfectant and the wound sewn up, but care must be taken to see that the two skins are not sewn together; each must be stitched separately and well washed with disinfectant. Place the bird in a quiet place and feed it for the first week or so on soft food only, but do not give too much food for the first few days or the crop may become too full and the stitches displaced.

(To be continued.)

Lamziekte or Gal-Lamziekte and its Prevention.

AN EXPERIENCED FARMER'S THEORIES.

[SOME little while back Dr. Theiler, Acting Director of Veterinary Research for the Union, expressed a desire for the views of farmers on the above obscure subject. Among those responding is Mr. J. F. Dugmore, of Belmont, Cape Province, who has had experience of the disease. His communication is reproduced herewith, not because any of the theories are accepted by Dr. Theiler, but in order to ventilate the views of the farmers and encourage others to express their opinions.]

Mr. Dugmore writes:—You have intimated that you are always pleased to hear the views of farmers with regard to this elusive disease. I use the term elusive advisedly as, just when some one advances a theory which to all intents and purposes appears to fit the case, some new development occurs which knocks the theory on the head. Take, for instance, the theory of want of phosphates. That bone meal is of use in strengthening the constitution of an animal, and thus rendering it able to withstand the disease, I do not for a moment deny, as I have proved this to be the case; but how is one to account for the following facts if want of phosphates is alone the cause. About twenty-five years ago a friend of ours, resident on the Campbell Plateau, where the disease first originated, wrote asking us if he could get grazing from us as his cattle were suffering from lamziekte. Having the authority of the Veterinary Department that the disease was non-contagious we granted his request. His cattle soon after arrival commenced to improve, and the lamziekte disappeared amongst them, but broke out amongst ours, the result being that we lost fifty of our best milk cows and one ox. Now, if the veld had been deficient in phosphates, according to all reasoning his cattle should not have improved, and we ought long ere this to have had cases among our own cattle. Trace the spread of the disease, and in all cases you will find that in some way or other it has been introduced. There have been times when we have been free of the disease for ten or twelve years, when a passing trek—having lamziekte among the cattle—has caused a fresh outbreak.

Now let me advance theory No. 1.—The disease is caused by a germ or microbe which lives on the phosphates of the animal into which it is introduced, thus rendering the animal deficient therein and in the end causing death.

Mode of infection.—The germ spores remain in the bones of animals which have died, and their vitality is such that, months afterwards, an animal chewing these bones is liable to contract the disease. Or the disease is communicated by the means of ticks, as in East Coast fever. Reasons for the morbid appetite of cattle, as shown in the tendency to eat old bones, offal, hides, sacking, etc.: this I attribute to internal parasites, as a morbid appetite is also created amongst human beings when so affected. It may be that internal parasites are the means of communicating the disease, thus taking the place of ticks in East Coast fever.

Reasons why *sterilized* bone meal has a beneficial effect:—

1st. It helps to strengthen an animal's constitution, thus enabling it to withstand attacks.

2nd. It does away with the morbid tendency to chew up all bones found lying about the veld, thus doing away with the risk of infection from this source.

3rd. It provides the animal with an excess of phosphate which enables it to allow the phosphate-loving germ to get sufficient, without dangerously depleting its own store, until the germ period is over.

That animals constantly fed on bone meal do contract the disease is a well-known fact, but all observers state that they do so in a milder form. An accessory means to the death of the animal is the impaction of the blaarpens (or leaf stomach) and consequent inflammation. This, we are told, is always the result of want of exercise, and is not a disease in itself, but the result of a disease which does not allow the animal to move about. Assuming that the disease has to run its course within a certain number of days and that the animal stands every chance of recovery were it not for the impaction of the leaf stomach, it stands to reason that by keeping the bowels moving you are helping the animal to tide over this period.

Working on this theory, I have had practically no losses. As soon as I notice an animal showing signs of lamziekte I give it a strong purgative (from one to three pounds of epsom salts). I usually find this sufficient, as the animal very seldom gets to the complete paralysis stage when this is done. My losses have occurred when I have been from home for a period, and return to find an animal too far gone to dose effectively. Just here let me advise farmers against giving the meat of dead lamziekte animals to their herds, as it is an inducement to the latter *not* to report any cases they may notice in the incipient stage. The better rule would be to tell the herd that if he failed to report an animal sick in the first stages, should such animal die the carcass will be destroyed. If any animal which he had reported when it was slightly affected should die, then he would be allowed to cut off all the choice portions of meat (no bones), the balance being destroyed by fire.

Another remedy I find very useful (and have been successful with same after the animal has been down some days) is vinegar, either alone or mixed with chicory, mustard, or the medicine known as Harlemensis, followed by a purgative. One case I cured with vinegar was pronounced by Veterinary Surgeon Borthwick a typical case of lamziekte. The animal was lying for fourteen days under shelter, and was fed on forage. I was advised by several to make a sling so as to keep it in an upright position; but I did not wish to worry the animal, so left it alone, and was not at all surprised to see the animal get up by itself and go off to the veld quite cured, after being unable to move for two weeks.

Theory No. 2.—That gal-lamziekte, as distinct from typical lamziekte, is a form of combined rinderpest and lamziekte. Whether such a distinct germ could be evolved by the crossing of the rinderpest and lamziekte germ is not for me to say, but my experience has been that no salted rinderpest animal has ever contracted the disease (gal-lamziekte). In this I am borne out by the experience of several neighbouring farmers. It may be further contended that such a cross

has taken place between anthrax and lamziekte, otherwise how can we account for the beneficial effects produced by inoculation against anthrax by the De Beers Company.

Theory No. 3.—That the disease is a form of vegetable poisoning and that it is caused by wilted grass. This in a measure is borne out by the experience they had in England one year, when, owing to a bad hay harvest, large numbers of cattle were lost by what was termed chronic constipation caused by eating spoilt hay. The symptoms described were very similar to typical lamziekte. It has been noticed that this disease is most prevalent when the veld gets wilted. On the other hand, as the present time, we are having lamziekte when the veld has had no chance to wilt. Then again the disease has appeared on one farm and the neighbouring farm has not been affected, although the veld there has been equally wilted. That it is conducive to the development of the disease by lowering the vitality of the animals I do not for a moment doubt, but that it is the sole cause of the disease I distinctly deny. One peculiarity of purely South African (not introduced) diseases is that they are carried by the aid of insects as intermediary hosts. Seeing that this is the rule and not the exception, it remains for us to discover the germ and the intermediary host, and, should we fail in this, to look to some other cause.

Before going on to the last theory I would like to give an experience I have just lately had. On this farm large quantities of bulbs, known by the farmers as wild onions, grow. At certain times of the year no small stock are allowed to feed thereon, as a large proportion go mad and die. It is not the usual sturdy or gid caused by the cyst of a tape-worm on the brain; differing in this way, that the animal does not turn round, but keeps straight on, taking no heed of or—seemingly not—seeing obstacles. I have noticed a horse suffering from dikkop horse-sickness act in exactly the same way. I could not believe that the wild onion was the cause of the disease, so made a post-mortem examination and found that in every case the madness was caused by the grub of a warble fly, which was attacking the brain at the spot where the air passages of the nostrils passed by.

I then examined the wild onion plants and found the identical grub in the seed-pods thereof. Now I have noticed that, when stock eat largely of this plant, in bringing up the cud, quantities of green slime ooze out of the nostrils. The fly, probably attracted by the smell thereof, lays an egg or grub in the nostril, which, passing up the nostrils, causes irritation to the brain. It may be that it is the same warble grub often found in the nostrils of ruminants, and that the slime of the wild onion, being unpalatable, drives it to attack the brain; but, on the other hand, it would appear that the wild onion is its natural food, otherwise how account for the large quantities found in its seed-pods. This year we had a shower of rain in January, and none further until March. The wild onion did not seed well, only here and there a stalk with a few seed-pods could be seen, and nearly every seed-pod was grub-infected. About the end of February our cattle started getting mad. I was away at the time, and before I got back one was dead, having fallen into the dip in its agonized wanderings. I found twelve sick (eight got sick in one day). As soon as I saw the animals I realized that it was the same madness which yearly affected the sheep and goats, so I used the same remedies

as I applied to them and saved all my cattle. First, as prevention is better than cure, I had the cattle herded away from the wild onion. The sick cattle I had pulled down, and had their heads well pressed back with forehead touching the ground. Into each nostril I put a tablespoonful of paraffin, and an hour afterwards a large pinch of pepper or snuff. One cow that had been wandering about for a week—never once lying down—I fully expected to lose, but she was well the next day, only seemed to be suffering from stiff-sickness or laminitis. Now, it appears to me that the animals which were sick longest are going to develop long hoofs.

Now for theory No. 4.—Old hunters inform me that the hartebeest's head, between the brain and the horns, invariably contains grubs, whose work appears to be to keep the tubes and passages clean. The conformation of the hartebeest's head being different to that of cattle, is it not probable that, owing to the practical extinction of the hartebeest, the grub is taking up its abode in the head of cattle and causing injury to the base of the brain and marrow of the spinal cord? The latter, in an animal which has died of lamziekte, is in a very watery state, and drops out of the backbone when held on end. Any such irritation at the base of the brain and on the spinal cord would cause paralysis.

These theories may be very crude and provoke a smile, but they are the honest endeavours to arrive at a solution by a farmer who is unacquainted with veterinary science.

Outbreaks of Animal Diseases.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF JULY IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

PROVINCE AND DISTRICT.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Redwater.
I.—CAPE PROVINCE—																
Cape	.	.	.	.	.	.	.	2	.	In the Cape Province, Scab is dealt with by the Sheep Inspector's Department.	.	.	.	.	.	.
East London	.	.	1	.	.	.	.	.	.		.	.	.	.	.	.
Humansdorp	1	.	.	.	.	.	.	.	.		.	.	.	.	.	.
Kingwilliamstown	.	.	1	.	.	.	.	.	.		.	.	.	.	.	.
Trankeian Territories and Tembuland—																
Umtata	.	1	.	.	.	.	.	.	.		.	.	.	.	.	.
Engcobo	.	1	.	.	3	.	.	.	.		.	.	.	.	.	.
Pondoland—																
Libode	.	.	.	.	2	.	.	.	.		.	.	.	.	.	.
Ngqeleni	.	1	.	.	.	.	.	.	.		.	.	.	.	.	.
East Griqualand—																
Umzimkulu	.	3	.	.	.	.	.	.	.		.	.	.	.	.	.
Tsolo	.	1	.	.	1	.	.	.	.		.	.	.	.	.	.
II.—NATAL*—																
Newcastle	.	1	.	.	.	.	.	.	.	22	.	.	5	.	.	.
Dundee and Umsinga	.	1	.	.	.	.	.	.	.	25	.	.	1	.	.	.
Klip River	.	.	.	.	.	.	.	.	.	23	.	.	.	.	.	.
Bergville	.	.	.	.	.	.	.	.	.	2	.	.	1	.	.	.

* For period 5th July—8th August, 1911.

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II.—NATAL (*continued*)—																
Estcourt	.	1	.	.	.	.	.	.	.	15	.	.	.	.	.	.
Weenen	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Umvoti	.	.	.	.	.	.	.	.	.	15	.	.	.	1	.	.
Inanda	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
Lion's River	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Pietermaritzburg & Umgeni	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Impendhle	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Ipolela	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Richmond	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ixopo	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alfred	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alexandra	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vryheid, Ngotshe, and Babanango	.	.	.	.	.	.	.	.	.	70	.	.	18	.	.	.
Utrecht	.	.	.	.	.	.	.	.	.	16	.	.	2	.	.	.
Paulpietersburg	.	.	.	.	.	.	.	.	.	10	.	.	.	.	.	.
Zululand	.	.	.	.	.	.	.	.	.	24	.	.	5	.	.	.
III.—TRANSVAAL—																
Barberton	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Bethal	.	.	.	.	.	.	.	.	.	10	.	.	.	.	.	.
Bloemhof	.	.	.	.	.	.	.	.	.	42	.	.	.	.	.	.
Carolina	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.

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III.—TRANSVAAL (*continued*)—																
Ermelo	.	.	1	.	.	.	.	.	.	8	.	.	.	1	.	.
Heidelberg	.	.	.	.	.	.	.	.	.	26	.	.	.	.	.	.
Krugersdorp	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
Lichtenburg	.	.	.	.	.	.	.	.	.	36	.	.	.	1	.	.
Lydenburg	.	.	.	.	.	.	.	.	.	12	.	.	.	.	.	.
Marico	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Middelburg	.	.	.	.	.	.	.	1	.	25	.	.	.	.	.	.
Piet Retief	.	.	.	.	.	.	.	.	.	12	.	.	.	.	.	.
Potchefstroom	.	.	1	1	.	.	.	.	.	40	.	.	.	.	.	.
Pretoria	.	.	1	.	.	.	.	1	.	5	.	.	.	.	.	.
Rustenburg	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Standerton	.	.	.	.	.	.	.	.	.	18	.	.	.	.	.	.
Wakkerstroom	.	.	.	.	.	.	.	.	.	21	.	.	.	.	.	.
Waterberg	.	.	.	.	.	.	.	.	.	2	.	.	.	1	.	.
Wolmaransstad	.	.	.	.	.	.	.	.	.	23	.	.	.	.	.	.
Witwatersrand	.	.	.	1	.	.	.	.	.	4	.	.	1	.	.	.
Zoutpansberg	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
IV.—ORANGE FREE STATE—																
Bethlehem	.	.	.	1	.	.	.	.	.	7	.	.	.	.	.	.
Bethulie	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.
Bloemfontein	.	.	.	.	.	.	.	.	.	18	.	.	.	.	.	.

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IV.—ORANGE FREE STATE (*continued*)—																
Boshof	.	.	.	.	.	.	.	.	.	36	.	.	.	.	.	.
Edenburg	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
Fauresmith	.	.	.	.	.	.	.	.	.	32	.	.	.	.	.	.
Ficksburg	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
Frankfort	.	.	.	.	.	.	.	.	.	10	.	.	.	.	.	.
Harrismith	.	.	.	.	.	.	.	.	.	33	.	.	.	.	.	.
Heilbron	.	.	.	.	.	.	.	.	.	10	.	.	.	.	.	.
Hoopstad	.	.	.	.	.	.	.	.	.	25	.	.	.	.	.	.
Jacobsdal	.	.	.	.	.	.	.	.	.	12	.	.	.	.	.	.
Kroonstad	.	.	.	.	.	.	.	.	.	17	.	.	.	.	.	.
Ladybrand	.	.	.	.	.	.	.	.	.	9	.	.	.	.	.	.
Lindley	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Philippolis	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.
Rouxville	.	.	.	.	.	.	.	.	.	36	.	.	.	.	.	.
Senekal	.	.	.	.	.	.	.	.	.	16	.	.	.	.	.	.
Smithfield	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.
Thaba 'Nchu	.	.	.	.	.	.	.	.	.	31	.	.	.	.	.	.
Vrede	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.
Vredefort	.	.	.	.	.	.	.	.	.	12	.	.	.	.	.	.
Wepener	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.
Winburg	.	.	.	.	.	.	.	.	.	23	.	.	.	.	.	.
Trompsburg	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.

Milk Records.

ELSENBURG.

THE following is the milk record of the Elsenburg College Herd for the month of July, 1911 :—

Breed and Name of Cow.	Days in Milk.	Yield in Lb.		
		During July.	Total to Date.	Daily Average.
FRIESLANDS.				
Rose	318	551	8365	26·3
Bell	247	517	5764	23·3
Veronica	224	446	4303	19·2
Cato	156	259	1499	9·6
Victoria	128	652	3434	26·8
Anna	114	288	1309	11·4
Christina 58	114	446	1944	17·0
Daisy	76	710	1972	25·9
Violet	65	982	2224	34·2
Beauty	63	1182	2364	37·5
Vera	63	1017	2200	34·9
Belladonna	25	998	998	39·9
JERSEYS.				
Gwendolen	107	476	1916	17·9
Gertie	107	624	2491	23·2
Grace	90	518	1726	19·1
Gus...	82	524	1378	16·8
Gladys	81	613	1686	20·8
Gilliflower...	61	365	940	15·4
Fanny	47	687	1017	21·6
Gipsy	21	580	580	27·6
Evelyn	20	283	283	14·1
AYRSHIRE.				
Lobelia	92	602	2141	23·2
CROSS.				
Bessie	20	729	729	36·4

The following are the average percentages of butter fat :—

Frieslands	=	3·39 per cent.
Jerseys	=	4·81 „
Ayrshire	=	4·0 „

TWEESPRUIT.

The following are the milk records for the month of June, 1911 :—

Breed and Name of Cow.	Date of Last Calving.	Lb. Milk.	Fat Test.
Frieslands.	1910.		%
Nora	20th October	451	3·8
Gertje	13th October	600	3·7
Japke	1st June	427	3·8
Dijkstra	18th November	480	3·7
Trijntje	13th December	521	3·5
Anna	11th January	555	3·0
Rinske IV.	7th May	1109	2·8
Veeman	11th April	999	2·7
Red Lincolns.	1910.		
Daphne	22nd December	475	3·9
Bracebridge	10th October	203	4·4
	1911.		
Dirce	28th May	800	3·2
Crino	6th June	754	3·2

GROOTVLEI.

The following are the milk records for the month of June, 1911 :—

Breed and Name of Cow.	Date of Last Calving.	Lb. Milk.	Fat Test.
South Devons.	1910.		%
Primrose	13th October	396	3·2
Merry Glass	19th November	391	4·0
	1911.		
Bertha	31st January	569	4·0
Sweetheart	18th March	593	4·2
Dauntless	1st May	657	4·0
Eva	3rd May	958	3·2

Results of Egg-Laying Competitions.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

Fourth Egg-Laying Competition.—16th May, 1911, to 15th May, 1912.

Record for July, 1911, and totals to end of July.

Pen Number.	Owner.	Breed. (Six Birds to a Pen.)	Record for Month. Eggs.	Weight. oz.	dwts.	Total to Date. Eggs.	Weight. oz.	dwts	Position to Date.
1	F. W. Nicholson..	Buff Orpingtons..............	5	10	15	5	10	15	26th
2	F. T. Hobbs	Silver Wyandottes............	7	13	3	32	57	11	24th
3	A. Riley.........	Black Minorcas (R.C.).........	19	34	2	46	78	6	22nd
4	N. Cole	White Leghorns (Amer.)	67	127	13	77	147	9	15th
5	S. T. Jones	White Leghorns (Amer.)	64	134	6	94	195	4	11th
6	H. Curtis..	White Leghorns (Amer.)	80	161	3	112	229	9	6th
7	S. C. Skaife......	White Wyandottes............	47	80	10	47	80	10	21st
8	A. Keppie.......	White Wyandottes............	28	51	9	69	124	7	18th
9	S. A. West.......	White Leghorns (Amer.-Danish)	68	145	6	82	173	0	14th
10	H. H. Bright.....	Black Leghorns	88	174	12	121	238	12	5th
11	B. Kauffmann ...	Brown Leghorns	56	120	3	67	143	4	17th
12	B. Kauffmann ...	Black Leghorns	52	111	7	95	199	15	10th
13	C. W. Pilkington .	Rhode Island Reds	16	35	4	35	81	0	20th
14	W. P. Cowan	White Leghorns (Eng.)........	89	160	13	143	253	13	3rd
15	A. J. Stacy......	White Leghorns (Aust.-Amer.) (Re-entered from last competition for second year test.)	65	140	6	94	205	14	9th
16	B. Kauffmann ...	White Leghorns (Eng.-Amer.)..	51	103	5	141	280	13	2nd
17	S. Smith	Brown Leghorns	58	120	13	71	143	14	16th
18	Mrs. H. H. Bright	White Leghorns (Aust.).......	53	98	14	60	111	10	19th
19	N. Cole	Brown Leghorns	66	141	13	113	243	8	4th
20	F. Molteno	White Leghorns (Amer.)	69	125	10	97	175	2	13th
21	C. H. van Breda..	White Leghorns (Aust.)	79	154	2	163	312	5	1st
22	Mrs. C. H. van Breda	White Leghorns (Amer.).......	48	91	0	116	223	14	7th
23	S. A. West.......	Brown Leghorns	78	148	1	103	194	13	12th
24	Graham, Hope & Co.	White Wyandottes	21	41	4	34	66	10	23rd
25	R. V. R. Jones ...	White Leghorns (Amer.-Aust.) .	23	45	5	27	53	4	25th
26	S. Smith	White Leghorns (Dan. & Amer.)	25	47	5	115	214	13	8th

Manager's Report for July, 1911.

There has, I am pleased to report, been a satisfactory increase in the egg yield this month, the total number laid being 1322 as against 548 for last month; and there would have been a still greater increase had the birds of the heavy breeds done their duty as the majority of those of the light ones are doing. The number of eggs from the former has been up to the present very disappointing, and it is during the winter months that we expect these breeds to give us a good supply. I know the general opinion is that the climate of South Africa is not suitable for heavy breeds; whether this is so or not, I am not yet prepared to say, but it must be remembered that the light breeds, especially the White Leghorns, and some of the Brown in this country consist principally of the descendants of imported birds of the world's best laying strains, whereas similar birds of the heavy breeds have not been introduced to the same extent. This fact is a strong argument in favour of the contention raised by Mr. Bright in a letter to the *Cape Times*, that in these competitions, a certificate should be given for each section. In justice to one pen of heavy breeds (Pen No. 24, White Wyandottes), I should mention that it came from up-country and five

of the birds went into moult after arrival (the other has been laying). They are now over it and commencing to lay. I think from their appearance and type they are from a well-known English strain, the birds of which were first at some of the laying competitions in England, and always high up in the others. If this is so, as time goes on their record should be of some help in solving this question.

The size of the eggs, taking them on the whole, is excellent, but the heavy breeds are again at fault here and are answerable for the smallest eggs—five under 1½ oz. from pen No. 7, White Wyandottes—and it seems that the larger the bird the smaller the egg she lays. Is this due to the craze in some quarters for size, abnormal size? I think so; for if you gain in size and go above the standard weight, you are sure to suffer in other qualities. It may be by accompanying coarseness of type, small eggs, etc.

We don't want a fowl as big as a turkey, but we *do* want one to lay well, and lay good saleable eggs. The utility qualities are the ones that pay best and help the industry. Where are the Black Spanish fowls which in their day were the best layers we had? Ruined and almost extinct solely due to the craze for breeding enormous earlobes.

Thirty-five birds have not yet laid, the majority of the others are laying well. No. 89 again heads the list of individual scores for the month with 25 eggs. She has laid 52 days out of the 77 the competition has been running, and as I mentioned in my last report she is in her second year and has been going through her moult, which is now almost over. The weight of her 25 eggs is 54 oz. 6 dwts. The next in order are No. 56, 24 eggs; No. 151, also 24; No. 52, 23; and Nos. 29, 30, 39, and 43, 22 each. The six birds that have laid the heaviest weight are:—No. 89, 54 oz. 6 dwts.; No. 52, 47 oz. 15 dwts.; No. 30, 47 oz. 13 dwts.; No. 29, 47 oz. 1 dwt.; No. 151, 45 oz. 8 dwts.; and No. 56, 45 oz. 6 dwts. One of the reasons for the increased number of eggs is in my opinion undoubtedly due to feeding the warm mash at night. It was thought advisable to do so instead of in the morning. It was commenced on 12th July. To go into this matter fully would take up too much space in this report (I intend to do so on another occasion). Suffice it to say that the two chief arguments in its favour are:—(1) It keeps the birds comfortable and warm during the night and prevents that rapid loss of body which is such a strain upon them, reducing their laying powers and affecting their health. I have found it beneficial in England, where in winter the difference of temperature between days and nights is often slight, but here it is doubly necessary where we have the days often warm and the nights very cold, the thermometer dropping rapidly just after the birds go to roost. (2) After a morning mash they are apt to hang about for some time doing nothing except putting on fat and catching colds, whereas their grain thrown in to the latter directly they come off the roost, and a handful of cracked grain to each pen in the same way once or twice during the day keeps them busy the whole day.

The health of the birds during the month has been excellent. There has been only one case of illness of any sort, and that, I regret to say, one of that scourge of poultrydom, as it is of humanity, "Tuberculosis"; in this case tubercular disease of the liver ("going light"), the very worst disease, in my opinion, to which fowls are heirs. Directly symptoms of this disease show themselves, the bird should be destroyed and the carcass burnt. Unfortunately in many cases the mischief is going on slowly internally without any external symptoms at all. In this case they manifested themselves first on 3rd July, but the post-mortem showed the disease to be longer standing. The liver was enormously enlarged, weighing ½ lb., and riddled through and through with tubercular deposits, the ovaries and intestines also shewed tubercle, the heart and lungs were much atrophied, as were also the muscles, in fact the bird was practically devoid of flesh, and its dead weight was only 1 lb. 15 oz. It has been replaced by another. This disease is absolutely incurable, and every poultry keeper ought to make himself acquainted with the symptoms and post-mortem appearances. I have no doubt that tuberculosis in the human race is due in a large measure to eating the flesh of tubercular birds. We have inspectors of meat: we should also have inspectors of live and dead poultry.

Nos. 152, 153, 154, 155, and 156, have been in full moult. No. 152 is through it (the others nearly so) and has started to lay again. It is very unfortunate for this pen, as it held the second place and has now fallen to the eighth. However, they are good layers and I have no doubt the pen will soon pick up again.

Nos. 31, 92, 93, 96, 122, 127, 128, and 129, are in partial moult chiefly of the neck hackle. Nos. 31 and 96 are nearly over it and have commenced to lay again. No. 39, on the 27th, showed signs of broodiness; she was at once removed from her pen, treated, and returned cured on the 29th, and is coming on to lay again. No. 94 had some difficulty in passing a soft-shelled egg and had to be treated. When a bird has any difficulty in passing an egg, it is always increased in the case of a soft one and greater care is necessary when treating her than in the case of a hard-shelled one.

Weather.—We have on the whole (considering that it is now the middle of winter) been favoured with good weather, although we have had eight stormy days (the 25th was the worst so far during the competition). Twelve very cold nights, six wet and stormy, that

of the 13th especially so. These changes are not exactly favourable to a heavy egg-yield. Some pens (the whole pen, not individual birds only) are more affected by these changes than others, which points to the fact that they and their immediate ancestors have been—I will not say coddled—but protected as much as possible from bad weather; this can be overdone. I believe in a bird being taken care of, still on the other hand, it should be brought up as hardily as possible, then during bad weather it is not liable to catch cold nor lay intermittently. In American and some other competitions, the birds during rain and snow are confined to their scratching sheds, here that is not so, and it is well for it provides a better proof of what they can do under usual conditions, which should be the object of all laying competitions, and so be a guide and help to all poultry breeders, large and small.

Arthur Little,
Manager.

CENTRAL EXPERIMENT FARM, CEDARA.

Results for Month of July, 1911.
(Competition commenced 9th July, 1911.)

No. of Pen.	Owner.	Breed.	No. of Eggs.	Weight. lb.	Weight. oz.
1	Mr. Greenough	White Leghorns	26	3	13
2	Mr. Doidge	White Wyandottes	36	4	9
3	Mr. Firmstone	Buff Orpingtons	37	3	15
4	Mr. Hutt	Black Leghorns	24	2	5
5	Mr. Mason	White Leghorns	14	1	3
6	Mr. W. F. Chapman	Buff Orpingtons	21	2	7
7	Mr. McEwan	White Leghorns	14	1	14
8	Mr. Stranack	White Wyandottes	33	3	14
9	Mr. Dewar	Silver Wyandottes	34	3	7
10	Mr. J. J. Mann	White Leghorns	5	0	7
11	Mr. Coupland Ferguson	White Wyandottes	26	2	15
12	Mr. Guy Blundell	White Leghorns	10	1	3½
13	Mr. Woodward	White Leghorns	1	0	2
14	Mr. Wilson	Buff Orpingtons	7	0	13½
15	Mr. Wilson	White Leghorns	2	0	4
16	Mr. Wilson	Black Minorcas	9	1	1
17	Mr. J. J. Mann	White Wyandottes	27	2	14
18	Mr Hulett	White Leghorns	20	2	6½
19		—	—	—	
20	—	—	—	—	

Correspondence.

This section will be set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture will be particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria", and written on one side of the paper only.

SHEEP AND THE BUTCHER.—EWES IN LAMB SACRIFICED.

To the Editor of the *Agricultural Journal*.

Sir,—I shall be much obliged if you, or one of my fellow-readers, will kindly assist me through the medium of your *Journal*, to solve the following question.

In my neighbourhood every other person one meets is a speculator, whose chief business it is to buy up small stock. At this period of the year it is detrimental to any farmer to sell to the speculator (i.e. to the butcher) a ewe in lamb, especially after last year's drought, which carried off over 80,000 sheep from the adjoining district. For our district I have no authentic statistics on hand, but I am sure that our losses were quite as great, and yet I have seen, up to three times in a single week, truck-loads of ewes, heavy in lamb and lambing (the lambs being destroyed immediately after birth), being sent off to the butchers. Our district is sparsely stocked, and this year every opportunity has been given us to bridge the gap, but what hope is there when the remnants of last year's ewes, together with their progeny, are now being butchered?

On the other hand the demand for mutton is great, and hamels alone cannot fulfil the demand, and hence the unfortunate ewe and her lamb have to forfeit themselves.

If I remember rightly a law forbidding that a ewe in lamb should be slaughtered was enforced shortly after the war, and I think the fact that this decree is non-existent to-day proves that it is impracticable.

There are many theoretical ways of solving the question, but it is a difficult task to puzzle out a practical one.

The question is: Can this state of affairs be remedied or not?—Yours, etc.,

Vrede Farm, Belmont, C.P. W. B. Humphreys.

KEEPING PORK FROM GOING RANCID.

To the Editor of the *Agricultural Journal*.

Sir,—In the *Journal* some few issues back I noticed a query from "Manor House", Wheatlands, as to the best means of preventing pork from going rancid. We are eating a ham cured in July, 1910. It was dry-salted and never turned over; after three weeks it was taken out and allowed to dry off, then packed in wood ash (thornwood preferable) and left there completely covered over and the lid of the box placed over. As the bacon or ham was required it was taken out and the ash closed over carefully and left until required again. This method was given me by a lady friend in the Bedford district years ago, and we have kept to it. The ash must be collected every day and kept clean until sufficient is obtained for the above purpose, and when the ham is needed for cooking just brush off the ash and boil.

We only cure pork for our own use. For a pig weighing 150 lb. we use 5 lb. of salt, 1 oz. saltpetre, 1 oz. carbonate of soda, and 1 lb. of dark sugar. I first sprinkle the pork with salt and sugar for twelve hours and draw off the blood.—Yours, etc.,

Graaff Reinet, C.P. Walter Jas. Edwards.

SHEEP-DIPPING.

To the EDITOR of the *Agricultural Journal*.

SIR,—Referring to Mr. N. A. Blankenberg's letter, I should like to tell him that according to my experience, dipping on cold days is more harmful to stock than dipping on warm days. Those who have no water can easily collect the water on cold days and keep it for dipping purposes until there occurs a warm day.

It is much easier to start early with dipping on a warm day, as the sheep are then able to graze again in the afternoon, and it is hardly possible to see, from their condition in the evening, that they have been dipped, if the dip did not generally give the animals a darker colour. There will be no change in their general condition and their growth will not be retarded.

However, if they are dipped on a cold day, you will still be able to see, after two days, that they suffer from the dipping and that they are not in as good a condition as before. Even when your sheep are sheared in cold weather you can see how emaciated they become.

I think the best way to eradicate scab is to dip your animals well and thoroughly, and if you keep them long enough in the dip all the lice will be killed. You will not even feel the cost of dipping on account of the great success you will achieve through it.—Yours, etc.,

Petrusville. SHEEP FARMER.

SCAB: ITS NATURE AND TREATMENT.

To the EDITOR of the *Agricultural Journal*.

SIR,—When reading Mr. Warren's contribution in the last issue of the *Journal* I at once said, Here is a practical farmer. I do not think there is an industry where theory is more deceptive than in farming. In theory and on paper the thing looks all right, but in practice it is: If God will, or the locusts, or the hailstorms, or the frost, or the insects and vermin, etc., or, as in this case, the scab.

Farmers have from time to time resorted to different measures. I will mention a couple of cases.

One farmer procured about 200 bastard sheep and let them sleep on an infected spot; within a fortnight scab showed among the sheep. He dipped them and sent them back to the same spot. The moment scab showed the sheep were dipped and returned until that spot was clean and the process repeated with other infected spots.

Another farmer again did the same thing as myself. Every Saturday morning all the sheep were brought to a kraal and a couple of hours spent in watching them. All hands must be there. The moment a sheep scratches or bites itself or draws the body to show that there is an itching at some spot which it cannot reach, that sheep is caught, examined, and the spot well dressed. The best dip for dressing purposes, to my mind, is paraffin oil mixed well half and half with some other cheap oil or melted lard.

I always dipped my sheep twice after they were sheared on or about the fourteenth and twenty-fifth days.

To cure sheep of scab is a very easy matter. Two dippings, twelve days apart, in caustic soda or lime and sulphur dips will do it, but to keep them clean is another matter. The infected spots on a farm are the curse.

Pretoria. GID. F. JOUBERT.

EXTERMINATION OF JACKALS BY JACKAL-PROOF FENCING.

To the EDITOR of the *Agricultural Journal*.

SIR,—In the last issue of the *Journal* I see a very interesting letter from Mr. John S. Conroy, Vogelstruisfontein, Richmond, on the above subject, but I think that the remedy which Mr. Conroy advocates for the extermination of these beasts of prey will not be very effective. In the first instance, it would not be possible to impose a fine upon every one who has not delivered a certain quantity of jackals' tails during the year to the magistrate, because, in order to escape this fine, it will only be necessary to be very careful not to kill all the jackals too quickly, otherwise there would be no more tails to be delivered to the magistrate, and the result would be a fine.

Secondly, to grant a prize to the person who has killed the largest number of jackals will not give the expected good results, as we have the great Bushmanland and other parts in our country where beasts of prey multiply freely amongst thousands of game, and where no people live who could destroy them.

Taking all these facts into consideration, I think there is only one way to exterminate beasts of prey, and this is by means of jackal-proof fences. The prosperity of the stock farmer depends greatly upon these fences, notwithstanding that they are more expensive than ordinary ones, but I do not think that it will be more than 1s. extra for every morgen of land, and that is nothing compared with the advantages derived from such fences. What could we not save in herdboy expenses; how many animals would we not be able to keep on the same piece of land, from where they must now be driven to the veld in the morning, to the water in the afternoon, and to the kraal in the evening, all on account of this vermin?

Further, I think Mr. Conroy is quite right when he says scab would be a matter of the past if our animals could run free and not be kept continually in kraals, where they are more apt to become scabby.

When I think of all these advantages I cannot understand why we should be bothered so much by a permissive fencing law, in order to develop our stock raising, and also to see so many fortunes lost in this industry, while most of the stock farmers, especially here in the north-western districts, are unwilling or unable to grasp the advantages which are to be derived from jackal-proof fences.—Yours, etc.,

Biesjespoort, P.O. Carnarvon, C.P. C. S. ERASMUS.

WARTS ON CALVES.

To the EDITOR of the *Agricultural Journal.*

SIR,—I see, in the July issue, a request for a cure for warts on calves. I find Cooper's dip a good cure for small stock, donkeys, and calves. I have tried it on them all and it is really a good remedy. Mix the Cooper's dip with a piece of plank into a paste-like cream and apply it with the piece of wood on the warts. A few applications will cure them.—Yours, etc.,

Middelplaats, District Barkly West, C.P. T. M. KENNEDY.

WHITE ANT DESTRUCTION.—DRASTIC SUGGESTIONS.

To the EDITOR of the *Agricultural Journal.*

SIR,—The two remedies following may be of use to your readers. I am sure of both, as I have cleared my orchard of white ants, and the fowls keep the cattle and goats pretty clear of ticks.

(1) Take a long iron bar, ⅞ or 1 inch in diameter, and drive a hole into the white ants' nest, slanting downwards. Then take a piece of fencing wire as long as the hole, tie two or three dynamite cartridges to it, fix a detonator and fuse to the dynamite, put to the bottom of the hole, and tamp the hole with a stick and earth. Then fire. Have a bucket of mud handy to cover cracks where the smoke escapes. The shock and the fumes will kill any that are left from the explosion. This quantity of dynamite will not blow off the top of the ant heap if the hole is put down five or six feet.

(2) To keep ticks on stock in check rear a brood of chicks in the kraal and keep them there. Fowls are greedy for ticks and the stock will stand or lie for the fowls to pick the ticks off their backs.—Yours, etc.,

A RHODESIAN FARMER.

CURDLING OF FRESH MILK IN BOILING.

To the EDITOR of the *Agricultural Journal.*

SIR,—*Re* the curdling of fresh milk when boiling. I had a Kerry cow some time ago that had a calf about eighteen months old, and was supposed to be four months in calf when I bought her. She was giving about four bottles of milk per diem, but as soon as the milk was boiled it curdled, just like the milk of a cow with a day-old calf.

The cow seemed in good health, but I thought it was perhaps on account of being in calf that was the cause of her milk curdling, so I stopped milking, and although I had her for quite two years after this she never calved. We thought this a very strange thing, as, although we have had cattle all our lives, we have never heard of such a thing as fresh milk curdling.—Yours, etc.,

Taung, Bechuanaland. G. M. CAMPBELL.

REMEDIES FOR ROUP.

To the EDITOR of the *Agricultural Journal.*

SIR,—In the August number of the *Journal* Mr. Walker asked for a remedy for roup. He stated that he had lost a number of fowls from the disease and that some had "wasted away". In my opinion this "wasting away" was due to roup in another form, especially as other fowls had died from roup. There seem to be many forms of roup. I have unfortunately had an experience with roup which I am not sorry to have had, as it has been a good lesson to me. When once it gets into the yard it is a most difficult thing to get out. The only way is to be constantly on the watch for it and isolate the bird at once; or, if it is not a valuable one, kill it. I do not consider Mr. Walker cleans his poultry runs sufficiently. My poultry houses are swept out every day and disinfected once every week by means of a spray pump used for garden work with strong liquid disinfectant. The spot where the food is thrown down is also swept every day. Proud's roup powder is put in the drinking water twice a week (the powder can be got from Messrs. Stranack & Williams, Durban), and about once a week a solution of salts and iron is used with the drinking water. Overcrowding is one of the chief causes of perpetuating roup. I try to place the chickens in fresh places every few hatchings, so as to prevent them contracting the disease, and twice a week I add sulphur to their soft food. I have got the disease well under this season, but last season was in a state of despair. I have now a healthy stock of fowls in about twenty pens, and not a sign of roup. One or two chickens have shown symptoms, but were at once isolated and given roup powder in their drinking water. So far, I have only lost one, which I killed, as it was not getting well quick enough. Care taken to ensure fresh and clean ground, and fresh and clean coops, will soon see the end of this most destructive disease.—Yours, etc.,

Mountain Rise, Maritzburg, Natal. (Mrs.) B. H. MULLENS.

MARKING WOOL BALES.

To the EDITOR of the *Agricultural Journal.*

SIR,—In the July issue of the *Journal,* page 5, "How to Brand", I observe the recommendation that farmers should put distinctive marks on the sides of their bales of wool, and as a seller of many years' experience, I cannot too strongly deprecate such a proceeding, as, when wool is stored at the ports of shipment in the Union or warehoused in London, the bales are invariably stacked *flat,* and any marks on the sides thus rendered valueless. The stacking is done in layers of three bales high, and this will, I trust, speak for itself in support of my contention.—Yours, etc.,

27 Castle Street, Capetown. H. FINDLAY.

NON-BEARING FRUIT TREES.

To the EDITOR of the *Agricultural Journal.*

SIR,—With reference to the question of Mr. G. P. Sheffield regarding treatment of fruit trees that do not bear, the following information may be of some use:—

I have noticed it to be mostly apple and pear trees that refuse to bear. Mr. Sheffield must try and prune his trees another way, namely, by not pruning out branches and shoots, but by topping the trees. All the top branches must be topped. I would also try and bruise the bark around the stems of some of the trees with a hammer. Both methods have a good effect here in Middelburg (Cape), and they might also answer at Mr. Sheffield's.

Kalkfontein, Rooispruit, via Rosmead. P. L. GROBBELAAR.

PORT JACKSON WILLOW SEED.

To the EDITOR of the *Agricultural Journal.*

SIR,—Will you kindly insert these few lines in the *Journal.*

About two years ago I sold, left and right from east to west, more than 100 lb. of Port Jackson willow seed for windbreaks for kraals, trees, and stock. Now I should like to know, through the *Journal,* whether they answer well, and whether they are killed by frost. I hope some of the friends who got some seed will reply in your *Journal.*—Yours, etc.,

Ruiterbosch, District Mossel Bay, C.P. J. D. BENEKE.

HONEY PLANTS.

To the EDITOR of the *Agricultural Journal*.

SIR,—Encouraged by the request for correspondence *re* honey plants in the article on that subject in the February issue of the *Agricultural Journal* by the Government Botanist (Transvaal), I beg to submit the following information.

Lucerne or alfalfa is a disputed source of honey in the Transvaal. The standard work of America on beekeeping states that it only secretes nectar in semi-arid districts, and that except under irrigation it does not rank as a honey plant. Mr. Frederick Sworder has stated that the aloe nectar will spoil all honey from other sources which may be gathered at the same time, and advised cutting off the flower stem of any aloe within the bees' flight to prevent the possibility of the honey already gathered from becoming contaminated with it. The "A B C of Beekeeping", which is the standard American work on the subject above referred to, does not mention the aloe in its list of honey plants, which contains the names of 274 distinct honey plants, shrubs, and trees. The English beekeepers are compelled to keep a watchful eye for the first appearance of aphidean honey-dew, which, as Mr. Burtt-Davy says, is not nectar but excrement, neither does it ever become honey. While as far as is known it is not injurious either to the bees or to human beings, if present in any quantity in otherwise good honey it imparts such a sickening taste that the English beekeepers advise that on no account should such stuff be offered for sale. As a beekeeper I wish to advise others against assisting to grow plants which are so admittedly injurious to the saleableness of any honey we may be so fortunate as to secure from our bees.

The wild cotton is a good honey plant and has been in bloom in this district for the last three or four months. Buckwheat gives a honey of a dark-purplish tint, but buckwheat sections, owing to the whiteness of the wax cappings, will hold their own with honey from other sources for appearance. I should like to point out to those who may wish to plant any crop for honey that it is necessary to plant acres of land to obtain a visible quantity of surplus honey.—Yours, etc.,

Wonderboom Apiary, Gezina, Pretoria. J. L. TAYLOR.

CARRYING WATER OVER A RIVER.

To the EDITOR of the *Agricultural Journal*.

SIR,—Could you or any of your many readers please tell me through the medium of your valuable *Journal*, what is the best way of carrying water across a river about 80 feet wide, for cheapness, strength, and durability.

The amount of water to be taken over when running in a furrow is 4 feet wide and 18 inches deep.

Have any of your readers perhaps experience of the stave pipe?—whether they will last a good many years when they are exposed to sun, rain, and wind; or will they crack or corrode in time?—Yours, etc.,

Graaff-Reinet, C.P. INQUIRER.

Water can be carried over a stream of this description in two ways. As to which may be the cheaper in the end, depends entirely upon the exact conditions of the site. The one way is to construct a flume which can be made of iron or wood, carried on either iron or wooden supports. Such supports could, of course, be constructed of brick, concrete, or stone, if considered suitable. The other way is to run it through pipes sunk in the bed of the river, thus forming a syphon. Such pipes could, of course, be carried across the river on supports if necessary, in the same way as the fluming. The pipes could be of iron, steel, or other durable material, including hard wood well protected. The stave pipes mentioned are highly spoken of by those using them, as also are the spiral steel pipes used by some. We have not seen such pipes capable of carrying the volume of water mentioned. The question of relative cost can only be decided after inquiry on the spot.—Editor, *Agricultural Journal*.

MARE THROWING TRIPLETS.

To the EDITOR of the *Agricultural Journal*.

SIR,—The illustration of the thoroughbred horse "Chesney", appearing in the June issue, recalls what is perhaps a unique "freak of nature" which occurred in this district last season, a well-bred mare giving birth to triplets—all colts—by the above-mentioned sire. The foals were all fully developed, but unfortunately only lived a short while.

I am not aware whether a similar occurrence has been recorded in your columns, but knowing how interested your readers are in these matters, I think the incident is worthy of record.—Yours, etc.,

Hatting Spruit Station, Natal. C. F. LAYMAN.

THE DIVINING ROD PROBLEM.

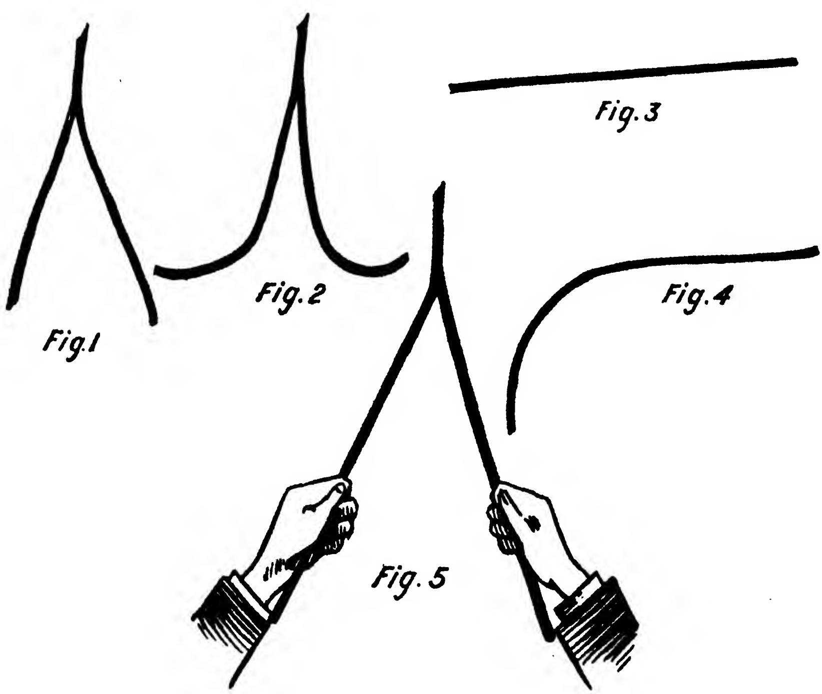
To the Editor of the *Agricultural Journal.*

Sir,—Having read with interest Mr. R. E. Goodale Oertel's letter on the above subject in the last issue, and even with the previous publication of Prof. Dr. Gustav Jager's and Prof. Dr. Karl Endriz's explanations, I am still unconvinced.

First of all, I venture to say that the subterranean waters of South Africa are not running in veins (aars) merely (as the diviner wants to put forward as the groundwork for his vocation, and that if you miss the vein by a quarter of an inch, you miss the water, but if you strike the vein, you tap one of the numerous underground rivers one so often hears of in South Africa). I am solidly of opinion that the underground waters are determined by conglomerate dykes, running more or less parallel throughout South Africa. Never by any chance will one be found running north and south, their directions being easterly and westerly.

Now, these dykes form a succession of impervious mounds behind which the water is held, and as these dams become full, naturally they find an overflow in the lowest portions of the dykes containing them, and this overflow constitutes the "fontein" of South Africa.

That being so, anywhere behind these dykes water may be found, it being only a matter of depth; then why does the diviner fail to realize this by his wand?



Of course there may be places where a small unserviceable quantity of water may be slowly percolating through crevices of rock to reach the water level of the dyke area in which it is contained, but there is no getting away from the fact that the water is controlled by dykes, and not by veins, and, that being so, according to the diviner's own theory, the divining rod should work anywhere and everywhere excepting on the dykes, and there, according to Mr. Oertel, the operator would want to be extra careful, because such a body of water being in close proximity might cause the wand to move so violently it might even become dangerous to the operator, in fact, he might be injured before he would have time "to throw it away."

As you are aware, Sir, the diviner's wand consists in our days of any sort of a forked stick, as Fig. 1. In fact, some diviners are so charged with magnetism they can get a fork made out of ordinary fencing wire to divine waters with absolute correctness guaranteed (clever people, some of these diviners).

In the manipulation of this wand (either stick or steel wire), it is so gripped by each hand of the operator as to become taut in the position of Fig. 2, and when once in that

position, the slightest alteration (increase of pressure or relaxation of pressure) will cause the end of the stick to move—as the diviner would say, due to the influence of water.

If a diviner will take a straight stick as Fig. 3, and hold it in one or both hands, then if that stick, in sympathetic answer to the water, assumes the position of Fig. 4; or if he holds the adapted fork in both hands, but thumbs towards the fork, as in Fig. 5, so as to give the stick a chance to do a bit on its own, and if the fork then bends itself down by sheer force of magnetism, or whatever that gifted material the diviner is possessed of, then I would say there is something in divining. I am convinced it is *not* the presence of the water, but the pressure of the hands on the bent fork that causes the stick to move, there being water practically everywhere, merely a matter of depth.

To hold the divining rod in the orthodox fashion for any length of time is tiring, and the operator cannot fail to alter his grip of the magic stick, and as soon as he does, it begins to "work". Of course, I quite admit that the alteration of the grip is, with many diviners, quite unconsciously performed.

I can make a forked stick "work", as the diviner would say, and even work so hard that the stick will turn round inside its own bark, but I know full well that it is the pressure of my hands doing it, and not the influence of the water, and I maintain that divining will always be looked upon suspiciously by the ungifted few, until such time as a diviner will arise from among diviners, and by the human magnetism within him cause a *straight* stick to bend without human assistance.

People are quite accustomed to hear that a diviner has located a spot, and put a peg in the ground, as *the* exact spot where water is to be found. There is really nothing in doing that, although the diviner frequently receives monetary consideration for it. The whole affair is perfectly safe, no risk or danger, but will Mr. Oertel "divine" a spot, and put his peg in, and then put down a deposit of say, £100, that *no* water will be found below his peg. You will find all diviners dead off that—and why?—Yours, etc.,

Palmietfontein, Natal Spruit. G. B. NEWMAN.

To the EDITOR of the *Agricultural Journal*.

SIR,—I hope you will allow me to give my views on the "divining rod", which seems to be commanding some interest just now. From what I can gather there is a good deal of speculation on the matter, and as you seem to approve of a bit of speculation now and again, here goes:—

It is a well-known fact that the rod must be taken from a plant that grows near water, or what may be called a succulent plant, such as the willow, the blue-bush, the mimosa or katdoorn. I may say with confidence that these are in themselves "water-showing plants". Long ago, before the divining rod became general, it was a sure sign of a vein of water if a row of these trees stood out in the open veld, and often has it been known that the roots of the katdoorn or mimosa are to be found right down at the water. Now, the rod that you hold in your hand is a part of that tree which has a wonderful power, the power—be what it may—of sending its roots down to the water; and the water circulates in the shape of the sap of the tree up into the very twig you hold in your hands. You have reversed the natural position of the twig, remember, and may there not be some force, as miraculous as most of nature's marvels, which we pretend to know a lot about, that makes the twig turn into its right position to allow the circulation to go on? Notice how strangely flowers can turn their little faces to the sun. But it is such a great force, you say. Observe the force with which a few tiny mushrooms lift a big clod of clay perhaps hundreds of times their own size. Call this "divining rod force" the "force of habit".

It amounts to this then. Is there such a thing as "the force of habit"? There is in man: will there be in inanimate objects? Who knows whether there is not in plants? How shall we explain Newton's Laws of Nature? There must be something of this kind at the back of them. To my mind it is mere chance that a body does not move in an arbitrary curve instead of in a straight line, etc.

Now what upsets my speculation a little is the fact that the rod is characteristically conservative; it refuses to act in some hands. There must be something here, too, that is strange. Mr. Oertel says in the last *Journal* that the power of working the rod can be cultivated. I feel the scientist sneer at me when I say that the "power of faith" goes along with the "force of habit". There are many more forces than we are aware of, cultivated by us from our childhood upwards. You see this "faith" everywhere. Most animals have it (instinct). Why, this pen moving in my hand is a miracle. Science tells me that it is brought about by a series of contractions of the muscles, and these in turn are governed by a seat of will-power in the brain. Yea, somewhere just behind the bump of "so and so"! And this little wall of will-power is controlled from—where?

I do not know what to call this second force; say the "force of credit"—not that powerful one which the commercial men know so well, but a power depending on the amount of credence I can put in a thing. This is either inborn or cultivated. To draw a parallel to the case of the pen mentioned above, or to show how infinitely far back that "seat of government" of the series of causes that lead to the writing lies, let me relate a short anecdote of an argument between Stuurman and Jafta on the shape of the earth. Stuurman holds the earth is round, Jafta asks what it rests on. Stuurman says: "A great big stone." Jafta asks what this stone rests on. "On another big stone", says Stuurman. "And this big stone?" Stuurman scratches his head, and says "On a great number of other big stones". Jafta, being a man of limited ideas, sees that the threads of argument are branching out to infinity, and gives it up.

I do not think that I have speculated any more recklessly than those who have touched upon the subject before me.—Yours, etc.,

De Rust, Oudtshoorn. W. M. FRASER.

Questions and Answers.

These pages will be devoted to questions, and an endeavour made to reply to all inquiries upon agricultural topics of general interest, or concerning any of the articles published from time to time in the *Journal*. In all cases replies will be posted to correspondents so soon as same have been procured.

Correspondents are requested to write on one side of the paper only. No manuscript will be returned.

All letters must be addressed to the Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria.

CHOREA OR ST. VITUS' DANCE IN DOG.

B. J. C. Naude, Nqunduza, P.O. Butterworth, writes:—I have a young collie dog, eight months old, that has what appears to be St. Vitus' dance. I was told that it is the effect of distemper, but he has not been ill, or, if so, we did not notice it. I have used camphor pills and blue alternately, but he does not seem any better. His nerves seem to be on edge and his legs "jump" as though he had St Vitus' dance. He has a very good appetite, and does not seem to be in much pain, though it worries him. The "twitching" of the body (especially the legs) is very bad at night, but not so bad in the daytime. This commenced about three weeks ago, and he seems to be getting weak in the legs. Could you or any of your readers tell me what to do for him?

Answer.—The Veterinary Division replied:—The condition described by you is, as a general rule, a sequel to distemper, though sometimes it may be due to the dog harbouring worms, and in this country there is reason to think it occasionally follows attacks of biliary fever. As your dog has not been ill, so far as you know, it is possible the trouble is due to worms. Chorea as the result of distemper or biliary fever is a most difficult condition to deal with, and does not readily respond to medicinal treatment, it is a diseased condition of the nerves and probably nerve centres. Medicines are not of much avail, the best results follow good nursing and generous feeding.

See that the dog is kept moderately warm, not exposed to cold or draughts, has a reasonable amount of exercise, and gets plenty of good nutritious diet, such as raw minced beef with plenty of fat in it and as much fresh milk as he cares to drink. A few raw eggs whipped up in the milk would also do good, and a tablespoonful of port wine added twice a day will act as a nutrient and stimulant. If you suspect worms get a chemist to make up a drench containing:—

Extract of male fern................	20 minims.
Santonin..........................	2 grains.
Kamala............................	20 grains.
Spirits of alther nitrosi..............	30 minims.
Castor-oil	2 ounces.

To be well mixed together and shaken up and administered to the dog on a fasting stomach in the morning. After the medicine has acted good nutritious food as above referred to should be given.

TREATMENT OF OLD LANDS FOR MEALIES.

F. G. Siddle, P.O. Devon, Transvaal, writes, under date 23rd July:—Would you kindly inform me, by post, if, in ploughing ground now, which is very moist (not wet)—it is also frosty at night—it would be best to harrow at once to save moisture or to let it lay for the frost to get at it? I refer to old lands not newly broken. I have also a Cambridge roller: could it be used now other than to break up lumps; the soil is on the sandy side and loose. I intend to plant teff on most of it, also mealies.

Answer.—The General Manager, Experiment Farm, Potchefstroom, replied:—Except during the wet season of the year and during showery weather, I recommend, in ordinary conditions in this country, that land should be harrowed immediately after ploughing in order to preserve the moisture. If the plough is a double furrow one, a good plan is to fix an arm on to the frame of the plough in order to drag a harrow behind the plough. It should not be necessary to roll at this season of the year, but it may be advisable to roll the land for the teff crop, either prior to or immediately after sowing the seed.

BRAK WATER.

"XXX", Steytlerville, Cape Province, writes:—The water in this and the adjoining districts is very brak, due not to lime but in some measure to gypsum. A theory holds ground here that the water from wells, which is brak too, should lie exposed to the air in open tanks for at least twelve hours to be innocuous to plants and trees; that the evil effect of immediate use is not apparent for a few years; and that after seven years, say, the trees die off. One would think that, after evaporation, the proportion of injurious salts would be increased. Do any of your readers know anything of the matter?

Answer.—The Acting Chief Chemist replied:—Storage of brak water with free access to air, in open tanks, would not improve the quality of such water. The time that would elapse before the effects of irrigation with brak water could become apparent is largely dependent upon the composition of the water, the composition and nature of the soil and sub-soil, height of soil water, drainage, etc. In some cases such circumstances may exist that a very long time would elapse before the use of brak water would produce noticeable effects, and on the other hand such conditions may in other places exist that the land is irremediably spoilt in a comparatively short while.

ERADICATING TWITCH-GRASS (*CYNODON DACTYLON*).

E. M. Elliott, Marseilles, Orange Free State, asks:—Could you give me any advice *re* the destruction of twitch-grass on cultivated land? I tried ploughing the land, but found that it spread the grass, and then tried digging out same, but, as there are acres of twitch-grass amongst my lands, it is a very slow and expensive method. I should therefore be glad of your advice.

Answer.—The Government Botanist (Transvaal) replied:—Although this weed spreads rapidly and soon becomes a serious menace to agriculture if not properly handled, the experience of farmers in South Africa and elsewhere shows that it can be dealt with if proper precautions are taken. Many farmers have had experience with this pest, especially when taking over farms previously worked by Kaffirs. Kaffir farming is probably the greatest cause of the spread of this pest in South Africa. If the roots and underground stems of the twitch-grass are exposed to frost and sun during the winter months, they soon dry out and die, but if a single joint is left covered by the soil it will retain life and the power of growth for a very long time, and it is this which causes the difficulty in eradication. It has been found in practical experience, however, that if land infested with twitch-grass is deeply ploughed at the end of the summer season and left rough for a few weeks, then deeply cultivated, and again left rough for a period during the dry season and subsequently harrowed, a large portion of the twitch-stems and roots are brought to the surface and exposed to the drying influence of the winter air and sun. When dry, the plants are gathered together and burned. If the land is very badly infested with twitch-grass it is probable that additional cultivations and harrowings during the winter months may be required in order to get it quite clean, but I have seen badly infested lands practically cleared by one winter's treatment and a second winter may suffice to complete the task.

PASTURE GRASSES FOR THE GREAT WINTERBERG.

R. O. Miles, Fenella Falls, P.O. Winterberg Hotel, via Post Retief, Cape Province, writes:—My farm is situated under the Great Winterberg Mountain (south-western side). The altitude of this mountain is 7000 feet above sea-level. We have a good deal of mist and rain the whole summer. In winter heavy falls of snow, also rain. There is so much moisture that the frost is not so severe as it would be otherwise, although it is very cold in the winter. The pasturage is sour grass. I am unable to grow wheat on the lands owing to the mist rains during the summer when it ripens, but I grow forage to perfection. I have a number of lands and a vlei which I should like to fill with grass, suitable for winter feed for sheep and cattle, grass that would stand the frost and intense cold. One gentleman writing to the *Farmers' Weekly* mentioned "fescue" grass and "Kentucky blue", but he did not say if it remained green during the winter months.

Answer.—The Government Botanist (Transvaal) replied:—The best grasses for the situation mentioned by you would be *New Zealand Tall Fescue* (*Festuca arundinacea*), and *Paspalum dilatatum*. The former keeps green all winter. Paspalum gives a heavy yield of succulent nutritious pasturage, beginning growth very early in spring (August), and keeping on till late in autumn (June); but for about two months it is dormant, being affected by frost; at that time *Tall Fescue* takes its place. Seed in bulk can be obtained from Messrs. C. Starke & Co., Mowbray, Cape Province, and Messrs. Geo. Carter & Co., P.O. Box 292, Maritzburg, Natal.

QUILLING OSTRICHES.

Isaac Smith, El Dorado, District Aliwal North, Cape Province, writes:—In the June issue it is stated that June and July are bad months to quill in. (1) I shall be glad to know whether quilling one or two months before or after the mentioned months will not have a bad effect on the feathers or birds? (2) What would be the best month in which to quill ostriches? Our rainy season generally commences in February and stops in May. We also have very severe winters. (3) In quilling young ostriches before winter are the drabs and tails to be pulled at the same time? Supposing young ostriches are shedded at night, could the quills then be drawn during June and July? (4) Will any damage be inflicted on the following growth of feather or on a single feather, if the former are clipped too green? (5) What is the general custom: to clip drabs and tails or to pull them?

Answer.—The Acting Government Agriculturist (Cape) replied:—(1) Quilling before or after June and July might have a bad effect on the birds, and it is sometimes impossible to leave them until after July or to do them before June, in that case the birds should be put into a warm shed every night for two or three months until the warm weather starts and their feathers are well out of the sockets. A little grain fed to ostriches that have been quilled in winter is very beneficial as it keeps up the supply of heat. (2) The best month to quill in your conditions would be February; December, January, and March are also good months provided food is plentiful. (3) In quilling young ostriches (no matter what time of the year) the drabs and tails should always be pulled. (4) Provided a green feather is cut fairly high to avoid any excessive loss of blood, no damage is done to the succeeding growth. (5) Always clip drabs and tails, as by leaving them until fit to pull the feather is materially damaged and a much larger percentage of broken feathers is the result.

WARTS ON HEIFERS.

W. Falconer Smith, Homefield, Coalbrook, Orange Free State, writes:—Early last year a yearling heifer on my farm developed a number of warts all over the neck, which gradually spread, the warts assuming the size of a large breakfast cup. I tried all sorts of remedies, such as tar, dip, paraffin, etc., but with no beneficial result. A few weeks ago the skin about the affected part seemed to grow rotten and had a putrefying odour. I consequently shot the beast and buried it. I now notice several other valuable heifers are developing the same thing. Will you be good enough to suggest some remedy. I am at present painting the warts with diluted Little's dip. I may mention that when I cut open one of these warts it bled considerably and occasioned the animal pain.

Answer.—The Veterinary Division replied:—If the warts have necks to them, put a ligature round the neck in the form of a club hitch, namely, one that by pulling the ends you can tighten every day: in this way you should be able to get the warts to drop off. If the warts are flat, get a chemist to make up an ointment composed of one part of salicylic acid and eight parts of lard, and smear some of it over the warts once daily. An arsenical preparation—one part of arsenic to eight parts of honey—can be used in the same way, but care must be taken not to let any of the preparation get on the sound skin, as it will act as a caustic and burn it.

KICKING HORSE.

T. M. Garlick, Glenelly, Stellenbosch, Cape Province, writes:—I have a horse that kicks in the night—not at other horses, but simply to amuse himself, I think, as it is not a vicious kick. He has broken down two partitions, and now I have him against a wall in which he is starting to make a hole. He only kicks with the near hind leg. Could you or any of your readers inform me of a way to prevent him kicking?

Answer.—The Veterinary Division (Transvaal) replied:—Is it not possible that the horse is suffering from internal parasites of some sort? The symptoms described would at least point to some such trouble. It is, therefore, suggested that a chemist be asked to make up twelve powders, each containing sulphate of copper 20 grains, arsenic 3 grains, and powdered aniseed 2 drachms. Give the horse one of these powders morning and evening in bran mash, crushed mealies, etc., for six days in succession, and on the morning of the seventh day give him as a drench on a fasting stomach a pint of raw linseed oil to which add an ounce and a half of turpentine. If the horse will not take the powders in his food, make some oatmeal or mealie meal gruel, add a powder to a bottleful and drench him with it.

The horse can be worked during the time he is getting the powders, but should be given at least twenty-four hours' rest after the oil and turpentine.

MAIZE: GERMAN YELLOW AND CANGO.

G. J. Sorfontein, Nooitgedacht, P.O. Holfontein, Kroonstad, Orange Free State, writes:—I am sending you an ear of yellow maize grown extensively in the Kroonstad District, which is hardy against drought, foul lands, and bad treatment, and which we consider comes next to Hickory King as a cropper and is absolutely the best for feeding purposes. I do not wish to say more about the desirability of this variety but the farmers here consider it perfect. We sow it as late as 10th December and it still matures. In an article in the *Agricultural Journal* Mr. Burtt-Davy states that a red mealie should have a red cob, and with this variety it is just the contrary, it never has a red cob, always white if it is genuine. I have grown this variety for fifteen years and have seldom seen a red cob. This variety is known locally as "Du Toit's" mealie, but I am still doubtful of the name and would like to know what the true name is and whether it is known to Mr. Burtt-Davy and what he thinks of it. The ear I am sending is true to type, and although it is only a small ear I should be glad to know how many points out of 100 it would fetch? It is also stated that yellow and white Cango should have twelve rows, they have only eight rows here and we are of opinion that the latter is the correct number. Yellow Cango had a dark red cob, and the *Journal* says it should be white; which is correct?

Answer.—The Government Botanist replied:—The mealie sent is the "German Yellow", considered a good drought resister in the Free State and parts of the Eastern Province. This breed usually has a white cob, and is one of the exceptions to the rule, as already mentioned in several of my articles on maize. It would improve the quality if a red cob were to be developed. This could be done in a few seasons by selecting for seed those ears which have red cobs (stronks). They would not breed true the first year or two, but by continued selection of those having the reddest cobs, this character would become fixed in course of time. The faults I have to find with this ear are:—(1) Too short; (2) space between rows too wide; (3) grain very short (only $\frac{7}{16}$ inch; this should be increased to at least $\frac{9}{16}$ inch by selection and breeding); (4) the grain is too irregular in the rows; (5) the butt is not perfect; (6) the tip is not covered with grain; (7) the grain is uneven in colour at the caps; it would be a good plan to pick out the darker coloured grains and use these for seed. These will not breed true the first year, but by continued selection in this direction the breed can be improved greatly; (8) some of the grains on the ear are not fully developed; this is a defect and shows some inherited weakness. In scoring I should allow this ear 67.5 per cent., but it is not a fair test to judge by a single ear; if you will send me twenty ears, I shall be glad to report on them. I should also like to have a few with red cobs for examination. I like this mealie and think it can be improved into a very good breed. (2) As regards Cango, the characters of this breed are not well fixed, and it varies in different districts. The eight-row is more correctly known as New England, or Eight-row. As a rule both the Cango and Eight-row have white cobs, but a red cob is much to be preferred.

Ernest Sheppard, Sheppardsvale, P.O. Thaba 'Nchu, Orange Free State, asks whether it would be good policy to purchase Yellow Cango Maize seed grown on white cobs.

Answer.—The Government Botanist replied:—Yellow Cango is one of the exceptions to the rule that a yellow maize should have a red cob, and this fact has been mentioned in several of my articles on seed maize. Of course it would be desirable to develop a red cob for Yellow Cango, and I have no doubt that this will be done in time, but at present I am not aware that there is any seed of a red-cobbed Cango available in South Africa.

GALL AND LIVER SICKNESS IN TURKEYS.

I. S. Serraf, Frankfort, Orange Free State, asks for advice in regard to the treatment of turkey chicks affected with gall and liver sickness, the chicks dying between the ages of four and about forty-five days. He adds that he has tried epsom salts and pepper mixed with mealie meal, without success.

Answer.—The Poultry Expert (Transvaal) replied:—If your turkey chicks are troubled with liver sickness at this early stage it is probably due to unhealthy parent stock. You do not say what you feed your young turkeys on, but if you give them plenty of shallot tops finely chopped up and milk to drink as well as the usual feed you should have no trouble with them. Possibly you are breeding from immature stock, i.e. birds that are too young. If this is the case your losses are quite natural for turkeys should be at least eighteen months of age before being used for stock purposes.

KING ISLAND MELILOTUS (*MELILOTUS OFFICINALIS*).

A. B. Richardson, P.O. Box 163, Premier Mine, Transvaal, asks :—Can you tell me anything about a leguminous plant called "King Island Melilotus", used in Mildura, Australia, to renovate land, and said to be, of all legumes, the best fixer of nitrogen in soil?

Answer.—The Government Botanist (Transvaal) replied :—*Melilotus officinalis* is an excellent green manure plant, as are, also, other species of the genus, such as *Melilotus alba* and *M. parviflora*. These three plants have become naturalized as weeds in South Africa. Our experience is that stock usually refuse to eat them because of their bitter taste.

TREATMENT OF LAND FOR MANNA.

W. H. Reid, P.O. Box 130, Middelburg, writes :—In a previous number of the *Journal* it is recommended to sow manna in newly broken up land. Does this mean new land just broken, and can you give me any advice in regard to treatment?

Answer.—The General Manager, Experiment Farm, Potchefstroom, replied :—Manna is generally considered to be one of the most suitable crops for "new" land, i.e. land just broken up from the veld. The land should, however, be cross-ploughed and a fine and even tilth prepared before sowing the seed. Sow at the rate of about 10 to 12 lb. seed per acre, and harrow in the seed.

POULTRY BREEDING PENS—BEST BREEDS.

J. J. van der Merwe, Ladybrand, Orange Free State, writes :—Poultry-keepers advertise pens for pullet or cockerel breeding. If correct, how is this assured? (2) What are best breeds (*a*) for the table; (*b*) for egg production with an eye to the Johannesburg market?

Answer.—The Poultry Expert (Transvaal) replied :—The term "Pullet breeding" and "Cockerel breeding" pens does not mean that these pens will produce either all pullets or all cockerels, but rather that the pullet breeding pen has been mated up for the purpose of breeding good pullets for exhibition purposes, and the cockerel breeding pen with a view to breeding good cockerels for show purposes. This is termed "double mating" and it is only adopted by poultry keepers who breed birds for show purposes. (2) The best table bird is the Indian Game, but if breeding table birds for market purposes a cross between the Indian Game-Wyandotte, Indian Game-Orpington, or Indian Game-Plymouth Rock will give you very good results. With regard to the best laying breed, this entirely depends upon strain. There are good laying strains and bad laying strains of most breeds, but I prefer the White Wyandotte, Buff Orpington, White and Black Leghorns, and Anconas as egg producers.

MANGE IN HORSES.

S. de Beer, Elands Drift, P.O. Adelaide, Cape Province, asks :—(1) What is the best remedy for scab in equines—"Khaki brandziekte", as it is known by farmers owing to its having been very severe among horses shortly after the war? (2) Should any internal remedy be given? (3) Would dipping in arsenite of soda have any beneficial effect?

Answer.—The Veterinary Division (Transvaal) replied :—For scab or mange in equines the following is recommended. Make a dressing of equal parts of paraffin oil, linseed oil, and soap water. To every three pints of the mixture, add one ounce of sulphur. Smear this dressing all over the animal's body for three days in succession, then leave alone for four days, and on the eighth day wash off with warm water and soap. If a cure be not effected, repeat the treatment in ten days or a fortnight. Disinfect the stables, sheds, kraals, etc., with Jeyes' fluid, one part to twenty parts of water. Soap water is made by rubbing up a little soap in warm water, just the same way you would do to make soap water to wash clothes. Internal treatment for mange in equines is not recommended. It is a skin disease and external treatment and disinfection of the stable, etc., is all that is required. Plenty of good nutritious food will also assist, but the great thing is perfect sanitary cleanliness of all the surroundings of the animals. Whitewash the stables, sheds and kraals, and see that they are kept in a proper sanitary condition.

RESCUE GRASS (*BROMUS WILLDENOWII*).

Replying to Mr. A. Elston, Bolo, Cape Province, who forwarded a specimen of grass for identification, the Government Botanist (Transvaal) wrote :—The plant you enclose is Rescue grass (*Bromus willdenowii*), an imported grass excellent for winter feed if planted in fairly moist and shady places. It makes little or no growth in summer, and does not seem to thrive in veld conditions, perhaps because it is eaten out by stock.

Notes on the Weather of June, 1911.

CAPE PROVINCE.

By CHARLES M. STEWART, B.Sc.

UNUSUALLY high mean atmospheric pressure; warm days in the west but much colder than usual in the east; nights considerably colder than the average at most stations except in the south-west and south; severe frosts, particularly towards the end of the month; skies moderately clouded; rainfall less than usual except over the more northerly and southerly divisions; a few local thunderstorms, with some hail; showers of snow and sleet at the higher stations in the east from 24th to 26th; a marked prevalence of westerly and north-westerly winds were the leading features of the weather of June, 1911.

Division.	Mean Rainfall (1911).	Mean No. of Days.	Average Rainfall (1891–1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula......	5·42	10	5·84	13	— 0·42	— 7
South-west..........	2·76	7	3·48	8	0·72	— 21
West Coast.........	1·35	5	1·44	6	— 0·09	6
South Coast.........	2·47	6	2·18	6	+ 0·29	+ 13
Southern Karoo.....	1·24	4	0·90	3	+ 0·34	+ 38
West Central Karoo.	0·35	2	0·54	2	— 0·19	— 35
East Central Karoo..	0·51	2	0·42	2	+ 0·09	+ 21
Northern Karoo.....	0·47	2	0·62	2	— 0·15	— 24
Northern Border....	0·94	3	0·42	1	+ 0·52	+ 124
South-east..........	1·04	3	1·03	3	+ 0·01	+ 1
North-east..........	0·35	2	0·88	3	— 0·53	— 60
Kaffraria...........	0·32	2	0·79	2	— 0·47	— 60
Basutoland..........	0·55	2	0·98	2	— 0·43	— 44
Durban (Natal)......	—	—	0·94	—	—	—
Bechuanaland.......	0·61	2	0·39	1	+ 0·22	+ 56
Rhodesia...........	0·05	1	0·14	1	— 0·09	— 64
Orange Free State...	0·35	2	0·70	2	— 0·35	— 50

Precipitation.—The mean rainfall for June, based on returns from 306 stations distributed over the Cape Province, amounted to 1·52 in. on four days, being 0·02 in. or 1 per cent. more than usual, but 0·99 in. less than last month and 0·27 in. lower than in June, 1910. If, however, returns from 115 stations in the Orange Free State be taken into account the mean of all stations is reduced to 1·20 in. The accompanying table shows that a deficiency of rainfall was common to the greater part of the country, particularly in the east, in the Orange Free State, and Rhodesia, where the deficits were mostly between 50 and 60 per cent., ranging from 44 per cent. in Basutoland to 64 per cent. in Rhodesia; over the West and South-west, as well as in the West Central and Northern Karoos the proportional shortage was much less, ranging from 6 per cent. over the West Coast to 35 per cent. over the West Central Karoo. An excess of precipitation was experienced over only the South Coast, Southern Karoo, East Central Karoo, Northern Border, and Bechuanaland, or practically only the extreme north and south of the Cape Province, varying between plus 13 per cent. along the South Coast and 124 per cent. over the Northern Border. In the South-west the sectional rainfall was practically normal. The actual departures from the normal were nowhere very great, ranging from minus 0·72 in. over the South-west to

plus 0·52 in. in the Northern Border. Precipitation during this month was practically of the usual winter type of distribution, being heavier in the West than in the East, and in the South than in the North, a condition which also obtained over the Orange Free State. Summarizing the monthly totals, it is found that of the 421 stations (including those in the Orange Free State) only 11 suffered from absolute drought, but 185 had only between 0·01 and 0·50 in.; 93 had 0·51–1·00 in.; that is, two-thirds of the stations had 1 in. or less; of the others 59 had 1·01–2 in.; 29 had 2·01–3 in.; 15 had 3·01–4 in.; 12 had 4·01–5 in.; 6 had 5·01–6 in.; 4 had 6·01–7 in.; and 1 each had 7·01–8 in., 8·01–9 in., and 9·01–10 in.; the four having quantities exceeding 10 in. were: Waai Kopje, 10·33 in.; Maclear's Beacon, 10·84 in.; St. Michael's, 11·12 in.; Waai Vlei, 11·13 in.; all on Table Mountain. Amounts exceeding 4 in. were confined to the Cape Peninsula, South-west, and South Coast Divisions. On similarly treating the maximum amounts recorded during the 24-hour periods at 298 stations in the Cape Province it is found that the daily totals were nowhere unusual, the greatest daily fall being only 3·04 in. at Kenilworth on the 13th, while 11 stations had 2·01–3 in.; 45 had 1·01–2 in.; 76 had 0·51–1·00 in.; 160 had 0·01–0·50 in.; and 5 had nil. *Thunderstorms* were comparatively few in number and limited in distribution, there being only 37 instances of this phenomenon noted on 13 days, principally on the 12th. *Hail* was noted at 18 stations on 4 days, almost entirely on the 25th and 26th. *Snow* fell at 4 stations on 5 days, mostly on the 25th and 26th; mostly the higher stations in the eastern half of the Cape Province were affected, although showers fell at Algeria (Division Clanwilliam); the main portion of the country over which snow fell extended from the neighbourhood of Graaff-Reinet eastwards to Umzimkulu in Kaffraria, and from Qacha's Nek in Basutoland southwards to the Katberg Range. The falls were mostly light, merely making the ground white at a few stations, but lying to a depth of 1 in. at Kokstad and 2 in. at Tabankulu. *Sleet* was reported from 20 stations on 4 days, 3rd, 25th, 26th, and 27th, but principally on the 25th and 26th.

Temperature, Cloud, and Wind.—The mean temperature of all stations during June was 53°·5, or 3°·9 lower than during the preceding month, and 0°·5 lower than during June, 1910. Compared with the previous month the mean maximum temperature (64°·8) was only 2°·7, but the mean minimum was 5°·0 lower than during May; and compared with the corresponding month of 1910 the days were 0°·5 warmer and the nights 1°·3 colder than during that period. On contrasting the means for this month with the normals it is found that the mean daily temperature was 1°·2 lower than usual, the deficit being almost equally divided between the days and the nights, the mean maxima being 1°·1 and the mean minima 1°·3 lower than the corresponding normals. At the individual stations there was an excess of monthly temperature amounting to 1–2° over the South-west and the Cape Peninsula, the excess decreased to a few tenths or becoming normal at a few stations along the South Coast, whereas a deficit of 1–4° was experienced in the East and over the central portions of the Province. The deficiency was greatest (3°·8) at Kokstad. An excess in the day temperatures was also limited to the South-west, Cape Peninsula, and the western portion of the South Coast Divisions, where it varied from 2°·8 to 0°·3, deficits of 1–4° being common to the rest of the country, increasing to 5°·8 at Bloemfontein. Subnormal night temperatures were common to almost the whole country, the deficits being greatest over the East and at the South Coast stations, where they were mostly between 2–4°, but increasing to 5°·1 at Kokstad. These deficits decreased northwards and westwards, being only a few tenths in the north of the Cape Province, and about 1° at the more inland stations of the South Coast Division. An excess of about 1° was met with at most of the stations in the South-west, and of a few tenths in Basutoland and at Bloemfontein. The mean daily range was 22°·5, that is, 2°·3 and 1°·8 respectively greater than in May last and June, 1910. The mean warmest station was Cape St. Francis, with a temperature of 58°·4, and the mean coldest Hanover, with 40°·2, a difference of 18°·2. The highest mean maximum was 71°·5 at Chiselhurst, and the lowest mean minimum (24°·8) at Hanover. The warmest periods of the month were from 8th to 11th, and 17th to 22nd (although a few stations reported maxima on days other than those named), but the highest readings were most commonly registered on 9th, 10th, and 19th to 21st. The coldest periods were from 15th to 18th and 26th to 30th, mostly on the 28th, although minima were also recorded on 1st and 13th at a few stations. The mean of the highest readings at all stations was 78°·1 or 3°·6 less than in May, but 2°·5 greater than during June of the previous year, whereas the mean of the lowest readings (32°·9) was 5°·1 lower than in May and 3°·0 less than in June, 1910. The mean monthly range (45°·2) was therefore 1°·5 and 5°·5 greater than during the immediately preceding month and June of last year, respectively. The extreme readings during the month were 87°·0 at East London on the 20th, and 16°·0 at Hanover on the 26th, making an extreme range of 71°·0 over all stations during the month. *Frosts* were of daily occurrence, and were particularly severe and wide-spread from 27th to 30th, and on 16th; in all, 263 instances were noted during the month, being about four times as numerous as during the previous month, and about 50 per cent. more than in June of last year. In the Ceres District 6–8°·5 were noted during the last

4 days; at Theefontein (Division Hanover), 10–11° from 26th to the end of the month; and at Teyateyaneng, 6–11° during the same period; while at Sutherland 12° of frost were registered on 13th and 17° on the 30th; at Matopo Park (Bulawayo), 13° to 16° on grass on 6th, 7th, 27th, and 28th. At Retreat, in the Cape Peninsula, the mean minimum temperature over grass was 40° ·3, or 4° ·0 lower than the shade minimum. This thermometer fell below freezing point on the mornings of 17th, 28th, and 29th, reaching the minimum of 29° ·0 on the 28th and the maximum of 51° ·8 on the 6th. Hoar-frost was also noted on sacking exposed during the nights of 15th and 16th, but was not deposited on grass.

The mean amount of *cloud* during the month was only 36 per cent., or 3 per cent. more than in May, but 2 per cent. less than during the previous June. It averaged 45–50 per cent. over the Cape Peninsula and the South-west, decreasing to 38 per cent. along the South Coast, and being mostly between 20 and 30 per cent. over the East and North. It varied from 68 per cent. at Capetown (Hospital) to 5 per cent. at Mochudi, and was generally slightly above 50 per cent. at all stations actually on the coast. *Fogs* and *mists* were by no means widespread or of frequent occurrence, being noted only 63 times on 26 days of the month, principally the 3rd and 12th. The prevalent *wind directions* were north-westerly to westerly over practically the whole Province, but were north-easterly at Kimberley and Port St. John's, while north-easterly and south-westerly were of equal frequency at Kokstad. Over the South-west the winds were light and variable, with a large percentage of calms, while at Port Nolloth the main direction was east. The Royal Observatory records show a slight excess of winds from south-south-east, south-south-west, and west-north-west, with a large number of calms, but a decrease of all other winds, particularly of those from south and north-north-west. The mean force of the morning winds on the Beaufort scale was 1 ·82, corresponding to a velocity of 7 ·5 miles per hour, or 0 ·8 miles per hour greater than last month, but 1 ·1 miles per hour less than June, 1910. At the Royal Observatory the morning winds showed a mean velocity of only 2 ·2 miles per hour, or 4 ·1 miles per hour less than usual. Only 28 instances of *gales* and *strong winds* were reported on 13 days of the month, particularly the 25th. Ten *hot winds* occurred on 6 days, principally the 19th and 10th. No *duststorm* noted.

The mean barometric pressure at the Royal Observatory was 30 ·27 in., or 0 ·09 in. higher than usual; the readings ranged from 30 ·50 in. on the morning of the 27th to 29 ·91 in. on the evening of the 4th.

TEMPERATURE (JUNE, 1911).

Station.	Mean Max.	Mean Min.	Month Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory........	65·3	48·1	56·7	80·8	21st	36·7	16th
Capetown (S. A. College)...	66·5	49·3	57·9	81·5	21st	41·0	16th & 17th
Capetown (City Hospital)..	65.4	49·8	57·6	80·3	9th	41·8	16th
Blaauwberg...............	64·4	50·1	57·2	80·1	21st	41·0	27th
Bishopscourt.............	65·0	44·1	54·5	81·0	9th	35·0	28th
Wynberg.................	66·2	47·8	57·0	80·0	9th	39·0	28th
Retreat..................	67·4	44·9	56·2	82·7	9th	32·0	28th
Groot Constantia..........	65·1	49·6	57·4	80·0	9th	42·0	26th & 27th
Elsenberg Agricultural Coll.	66·1	48·7	57·4	79·0	8th & 9th	37·2	27th
Groot Drakenstein.........	66·5	43·8	55·2	79·9	1st	34·2	28th
Danger Point.............	62·6	51·8	57·2	73·0	9th	44·0	18th
Van Staaden's............	65·7	42·3	54·0	81·0	20th & 21st	33·0	18th & 28th
Port Elizabeth............	67·4	48·1	57·8	85·0	19th	40·0	28th
George Plantation.........	65·8	47·6	56·7	81·5	19th	38·8	28th
Mossel Bay..............	66·8	47·0	56·9	83·0	19th	40·0	28th
Uitenhage................	68·3	44·3	56·3	82·5	19th	30·0	18th
Cape Agulhas.............	62·9	50·6	56·8	79·0	10th	45·0	28th
Heidelberg...............	70·8	39·0	54·9	82·0	10th & 11th	33·0	17th, 18th, & 30th
Storm's River............	65·7	44·3	55·0	82·3	19th	27·0	13th
Dunbrody................	71·1	39·5	55·3	84·2	10th	28·2	16th
Cape St. Francis..........	65·2	51·6	58·4	84·0	19th	44·0	1st
Hanover.................	55·7	24·8	40·2	66·0	22nd	16·0	26th
Murraysburg..............	56·6	32·2	44·4	67·0	19th	21·0	15th & 16th
Kimberley................	62·6	36·6	49·6	71·2	18th	28·0	27th
East London..............	67·6	47·4	57·5	87·0	20th	41·0	29th
Kingwilliamstown..........	66·8	40·0	53·4	79·0	19th	31·0	28th
Sydney's Hope............	63·5	46·9	55·2	74·0	20th	36·0	27th
Lovedale.................	63·9	41·3	52·6	77·0	19th	30·0	28th
Cathcart.................	59·6	40·0	49·8	71·6	20th	28·6	17th
Evelyn Valley............	57·7	40·9	49·3	72·0	9th, 21st, & 22nd	32·0	1st, 27th, & 28th
Chiselhurst..............	71·5	37·3	54·4	86·0	19th	40·0	16th & 27th
Aliwal North.............	62·0	28·3	45·2	71·0	19th	18·0	28th
Queenstown..............	64·6	34·3	49·4	79·0	9th	23·0	28th
Kokstad.................	62·8	30·3	46·6	74·9	10th	19·1	29th
Tabankulu................	63·8	38·1	51·0	73·0	19th	28·0	28th
Main....................	64·5	40·9	52·7	75·1	20th	30·5	28th
Mochudi.................	70·9	35·7	53·3	78·0	14th, 17th, & 18th	24·0	28th
Teyateyaneng.............	56·4	31·2	43·8	63·0	18th, 20th, & 21st	21·0	28th
Means..............	64·8	42·3	53·5	78·1	—	32·9	—
Extremes...........	—	—	—	87·0	20th	16·0	26th

OBSERVERS' NOTES.

Groot Drakenstein.—Mean temperature of month 1°·1 above the average; rainfall 0·91 in. below the average; total rainfall for first half of year 13·88 in., or 75 per cent. of average; average rainfall of first half of year 18·29 in.

Kokstad (Coyte).—The last week of the month proved exceptionally cold. A heavy snowfall on the night of the 25th was followed by two days' bitterly cold gale from the south-west and then by very heavy frosts.

Kersefontein (Piquetberg).—A very disappointing month. Ploughing most disjointed and grain everywhere coming up very slowly and very thinly.

New Bethesda (Graaff-Reinet).—Frosts during this month of unusual severity.

Theefontein (Hanover).—Dense fog on 5th. Frosts occurred on 25 days; very sharp from 26th to end of month—thermometer registering 10° to 11° of frost at sunrise. Slight fall of snow on 25th; Sneeuwberg lightly covered. Days on the whole sunny and pleasant. Winds light and variable.

Glencairn (Cathcart).—Month marked by very severe frosts. Stock still looking well.

Huxley Farm (Stutterheim).—Mealie crop proved fair and good on some farms. Grass quite green still. Weather has been very mild. Live stock looking well. Several farmers are building cattle-dipping tanks in anticipation of the compulsory dipping Act being enforced here soon.

Sloote.—Exceptionally heavy frosts latter part of month.

Vruchtbaar (Wellington).—The rainfall, although far below last year's, was fairly evenly distributed over the whole month, and all cereal crops are looking promising. In citrus fruits this district has a record crop this season.

Kruis River (Uitenhage).—A very dry month until the 25th and 26th, when we had a good soaking rain, which has enabled a deal of ploughing to be done. More forage (oats) sown. Rain just right for barley, wheat, etc., and earlier sown oats. Has been extremely cold during this month; noticed frost on 15 mornings, but for want of instruments unable to keep a record. Snow was observed on the Winterhoek Mountains on the 27th and several days after. Stock doing well. Prevalent wind during the month west to north-west.

Uitenhage Park.—A cold- and till 25th—dry month. Ten frosty mornings, three hot winds. The maximum temperature (49°) on the 26th was the lowest recorded in Uitenhage for many years.

Sunnyside (Hay).—This month has had quite a phenomenal rainfall (1·01 in.), it being nearly double the amount registered during the corresponding month of last year, in other respects, however, there is very little difference, as the annexed table will show. Winter veld in splendid condition. All classes of stock looking healthy, sheep and goats especially, so farmers are anticipating a good season for lambs.

	Rain.	*Clouds.*	*Calm.*	*Dews.*	*Frosts.*
1910.........	3 days	7 days	13 days	1 day	15 days.
1911.........	3 days	11 days	7 days	5 days	15 days.

Bolotwa "Content" (Queenstown).—Dry and fair, relatively little wind. Very sharp frosts towards the end of the month.

Clifton (Sterkstroom).—Mild month. Veld still slightly green. Soil good for ploughing.

TRANSVAAL.

OBSERVER'S WEATHER NOTES FOR JULY.

SUMMARY.—The rainfall for the month has generally exceeded the average, only one district recording a deficit. In the north and south-east of the Province the excess is somewhat marked; but as July is generally a fine month with a low average rainfall, no heavy and continuous rains have been necessary to give this result.

BETHAL DISTRICT—

Onverwacht.—The weather during the month has been mild with the exception of about ten cold days. (S. N. de Kock.)

Leeuwkuil.—With the exception of the 7th, 8th, and 13th, 14th, and 15th July, the weather during this month has been mild for the time of year, and many days have been as warm as ordinary summer weather. The peach blossoms are almost bursting. (W. J. Wayland.)

BLOEMHOF DISTRICT—

Christiana.—Bright warm days were experienced during the month; severe frosts at night. Rain fell on the 28th and 30th. Heavy thunderstorm passed over the district on the afternoon of the 29th, but only a few drops of rain fell. (S. W. Davis.)

Katrina.—Cold weather was experienced at the beginning of the month. Light winds mostly from east. Good rains fell during last week of month accompanied by severe lightning. (P. W. Lombard.)

CAROLINA DISTRICT—

Waterval Boven.—Warm weather was experienced at the beginning of the month; from the 5th and few following days the cold was severe; weather suddenly became warmer. No rain fell. (H. C. Borcherds.)

LYDENBURG DISTRICT—

Belfast.—Severe frosts were experienced during the month. With the exceptions of some days with strong cold winds, the weather on the whole during the day has been pleasant. (G. I. Imrie.)

Graskop.—Unusually severe frosts doing damage to trees, etc., were prevalent. (G. Irvine.)

MIDDELBURG DISTRICT—

Middelburg.—The leading feature of this month's weather has been the apparent breaking of the winter, accompanied by a shower of rain, in the middle of the month, followed by a return of the cold, frosty weather, and during which the lowest minimum temperature recorded since 1905, i.e. for seven years, was registered. This late frost made a greater impression upon vegetation than the cold weather during the whole previous winter had done, many miles of gum and other trees in the Pan Plantation being " bitten " by it and the leaves killed. The fall of rain, though only a quarter of an inch in amount, is far more than previously recorded; on two other occasions little more than a few drops fell—0.05 and 0.07 in. in 1910 and 1908. (Dr. H. A. Spencer.)

POTCHEFSTROOM DISTRICT—

Kalbasfontein.—Very severe frost was experienced in the early part of the month; summer weather at the end. (J. Murray.)

Klerksdorp.—On the 29th at about 5 p.m. a severe storm of thunder and lightning, accompanied by strong wind and clouds of dust, occurred, but only a little rain fell. Later in the evening 0.45 in. of rain fell. (H. M. Guest.)

RUSTENBURG DISTRICT—

Brakkloof.—A cold month; severe frosts experienced for this locality. Such severe frosts have not been experienced for twenty years. (Lance-Corporal H. Streatfield, T.P.)

WAKKERSTROOM DISTRICT—

Wakkerstroom.—On the 11th of this month the tops of the surrounding hills were covered with snow. On the 15th an extremely cold wind from the south-west was experienced. (W. Pritchard.)

ZOUTPANSBERG DISTRICT—

Louis Trichardt.—Very low temperatures prevailed during the greater part of the month, the minimum reading of 30.5 degrees on the morning of the 1st being a record for this station. Ground frosts were also noticed on the mornings of 3rd, 5th, 6th, 16th, and 17th; 79.0 degrees, on the 7th, was the highest maximum. The majority of the days were bright and cloudless, but there were very many that were dull and oppressive owing not to clouds but to the heavy masses of smoke rising from extensive grass and bush fires in the neighbourhood. Barometric readings have been uniformly and almost phenomenally high throughout the month. (Sergeant J. C. N. Clark, T.P.)

Pietersburg.—Heavy frosts were experienced daily throughout the month; bright days. (W. J. Frankleyne.)

Rainfall for July, 1911.

CAPE PROVINCE.

I. Cape Peninsula :	Inches.
Royal Observatory (a) 12-inch gauge	4·06
Capetown (Hospital)	2·28
Sea Point (The Hall)	3·01
Camps Bay	2·85
Woodstock (The Hall)	4·38
Newlands (Montebello)	8·07
Bishopscourt	8·32
Kenilworth	8·87
Wynberg (St. Mary's)	7·24
Groot Constantia	7·19
Tokai Plantation	6·69
Muizenberg (Cooper)	7·25
Cape Point	1·62
Blaauwberg Strand	3·78
Robben Island	3·44
Maitland Cemetery	4·38
Tamboers Kloof	3·91

II. South-West :	
Eerste River	4·81
Klapmuts	5·10
Stellenbosch (Gaol)	5·84
Somerset West	4·85
Paarl	5·39
Wellington (Gaol)	4·05
Groot Drakenstein (Weltevreden)	6·16
Porterville Road	3·67
Tulbagh	5·13
Kluitjes Kraal	4·41
Ceres	8·57
Rawsonville	7·45
Caledon	3·87
Worcester (Gaol)	3·80
Hex River	4·80
De Doorns	4·22
Karnmelks River	3·76
Lady Grey (Division Robertson)	2·24
Robertson (Gaol)	2·84
Do. (Govt. Plantation)	2·42
Montagu	2·82
Danger Point	3·20
Elgin Plantation	10·84
Elsenberg Agricultural College	5·05
Roskeen	4·98
Vruchtbaar	4·38
Ceres (Heatlie)	9·03
Waverley (Tulbagh)	4·31
Dwaars Riviers Hoek	7·87

III. West Coast :	Inches
Port Nolloth	0·80
Anenous	1·73
Klipfontein	1·86
Kraaifontein	2·15
O'okiep	1·94
Springbokfontein	3·72
Concordia	1·44
Garies	1·74
Van Rhyn's Dorp	1·37
Dassen Island	3·48
Kersefontein	2·28
The Towers	3·44
Malmesbury	4·03
Piquetberg	3·35
Welbedacht	3·61
Hopefield	2·42
Algeria (Clanwilliam)	5·48
Cedarberg (Clanwilliam)	7·15

IV. South Coast :	
Cape Agulhas	3·10
Swellendam	3·85
Grootvaders Bosch	3·49
Heidelberg	1·77
Riversdale	2·80
Vogel Vlei	2·23
Mossel Bay	2·07
Great Brak River	2·11
George	2·20
George (Plantation)	2·13
Millwood	2·67
Sour Flats	2·72
Buffel's Nek	3·09
Plettenberg Bay	3·82
Harkerville	3·80
Blaauwkranz	2·79
Lottering	2·74
Storms River	2·75
Witte Els Bosch	2·03
Humansdorp	1·90
Cape St. Francis	2·19
Kruis River	0·69
Uitenhage (Park)	0·78
Do. (Inggs)	0·94
Armadale (Blue Cliff)	0·44
Dunbrody	0·24
Port Elizabeth (Harbour)	2·12
Do. (The Slip)	1·70
Do. (Walmer Heights)	2·33

IV. SOUTH COAST (*continued*):

	Inches.
Shark's River (Nursery)...	2·15
Centlivres...	0·59
Edinburgh	3·13
Gamtoos Station ...	1·60
Zoetendals Vallei...	3·15

V. SOUTHERN KAROO:

Triangle	2·64
Pietermeintjes	3·46
Ladismith ...	0·85
Amalienstein	0·98
Calitzdorp...	0·53
Oudtshoorn	1·20
Uniondale...	1·06

VI. WEST CENTRAL KAROO:

Prince Albert	0·88
Dunedin	0·45
Nels Poort	0·02
Camfers Kraal	0·00
Krom River	0·00
Willowmore	0·20
Rietfontein	0·05
Steytlerville	0·00
Lemoenfontein	0·00
Merweville	0·33

VII. EAST CENTRAL KAROO:

Aberdeen (Gaol) ...	0·03
Klipplaat ...	0·00
Klipdrift ...	0·00
Kendrew (Holmes)	0·00
Graaff-Reinet (Gaol)	0·11
Do. (Eng. Yard)	0·00
New Bethesda	0·05
Roodebloem	0·00
Glen Harry	0·00
Wellwood ...	0·31
Bloemhof ...	0·16
Jansenville	0·15
Roode Hoogte	0·29
Toegedacht	0·00
Klipfontein	0·C0
Cranemere	0·00
Middlewater	0·00
Somerset East (Gaol)	0·40
Spitzkop (Graaff-Reinet)	0·00
Villeria (Aberdeen)	0·05
Gordonville (Graaff-Reinet)	0·42
Zeekoe River	0·00

VIII. NORTHERN KAROO:

Calvinia ...	1·68
Sutherland	2·10
Fraserburg	1·37
Carnarvon...	0·14

VIII. NORTHERN KAROO (*continued*):

	Inches.
Brakfontein	0·00
Victoria West	0·12
Britstown ...	0·15
Wildebeestkooij	0·16
Murraysburg	0·04
Richmond ...	0·14
Hanover ...	0·14
Theefontein	0·37
Philipstown	1·09
Boschfontein	2·23
The Willows (Middelburg)	0·24
Colesberg ...	1·06
Varkens Kop	0·27
Culmstock	0·19
Cradock (Gaol)	0·30
Maraisburg	0·45
Steynsburg (Gaol)	0·98
Tarkastad ...	0·58
Drummond Park ...	0·80
Schuilhoek	0·43
Vosburg ...	0·22
Zwavelfontein	0·20
Zoetvlei ...	0·25
Klipkraal ...	0·30
Hotweg Kloof	0·25
Thebus Waters	0·34
Ruightersfontein ...	1·20
Esperanza...	0·60

IX. NORTHERN BORDER:

Pella	0·00
Kenhardt ...	0·18
Upington ...	0·21
Van Wyks Vlei	0·36
Prieska	0·12
New Year's Kraal	0·42
Dunmurry	0·68
Karree Kloof	0·32
Griquatown	0·66
Douglas ...	0·63
Douglas (Voss)	0·58
Hopetown	1·02
Newlands (Barkly West)	0·85
Barkly West	1·01
Kimberley (Gaol)	0·95
Do. Stephens	1·02
Strydenburg	0·00
Rietfontein (Gordonia) ...	0·60
Stoffkraal (Prieska)	0·15
Sunnyside (Hay)...	0·36
Rocklands ...	0·95
Sydney-on-Vaal ...	1·35
Warrenton	0·93

X. SOUTH-EAST:

Melrose (Division Bedford)	0·05
Dagga Boer	0·37
Lynedoch ...	0·23
Cheviot Fells	0·91

X. SOUTH-EAST (*continued*):	*Inches.*
Bedford (Gaol)	0·59
Do. (Hall)	0·48
Sydney's Hope	0·67
Adelaide	0·53
Atherstone	0·00
Alexandria	1·90
Fort Fordyce	0·57
Heatherton Towers	0·57
Sunnyside	0·41
Fort Beaufort	0·43
Katberg	0·38
Seymour	0·00
Glencairn	0·50
Hogsback	0·68
Peddie	0·21
Exwell Park	0·93
Keiskamma Hoek	0·36
Cathcart (Gaol)	0·80
Cathcart (Forman)	0·76
Thaba N'doda	0·20
Evelyn Valley	1·07
Crawley	0·28
Pirie Forest	0·83
Isidenge	0·57
Kologha	0·43
Kingwilliamstown (Gaol)	0·26
Fort Cunynghame	1·52
Dohne	0·00
Kubusie	0·45
Quacu	0·79
Blaney	0·13
Bolo	0·73
Fort Jackson	0·00
Komgha (Gaol)	0·69
Chiselhurst	0·59
East London West	0·76
Cata	0·90
Wolf Ridge	0·37
Dontsah	0·34
Mount Coke	1·10
Albert Vale (near Bedford)	0·15
Huxley Farm (Stutt.)	0·80
Amabele Junction	0·22
Eastover	0·28
Tzelini	0·35

XI. NORTH-EAST:	
Venterstad	1·40
Mooifontein	2·48
Burghersdorp (Gaol)	2·48
Lyndene	2·45
Broughton (Molteno)	2·68

XI. NORTH-EAST (*continued*):	*Inches.*
Thibet Park	0·63
Sterkstroom (Station)	0·85
Rocklands	0·94
Aliwal North (Gaol)	1·64
Poplar Grove	0·74
Jamestown	2·83
Herschel	2·18
Lady Grey	2·65
Lauriston	1·75
Lady Frere	0·95
Contest (Near Bolotwa)	0·90
Keilands	0·85
Barkly East	1·25
Blikana	1·39
Hughenden	2·22
Indwe (Collieries)	1·05
Sunnymeade (Albert)	1·25
Clifton (Sterks.)	0·97
Edendale	0·89
Strydpoort (Dordrecht)	2·34
Avoca (Barkly East)	3·31

XII. KAFFRARIA:	
Ida (Xalanga)	0·86
Slaate (Xalanga)	0·66
Cofimvaba	0·71
Tsomo	0·49
N'qamakwe	0·84
Main	0·43
Engcobo	0·59
Butterworth	0·57
Kentani	0·30
Maclear Station	0·46
Bazeya	0·94
Willowvale	0·40
Somerville (Tsolo)	0·52
Elliotdale	0·35
Umtata	0·22
Cwebe	0·92
Tabankulu	0·20
Kokstad (The Willows)	0·08
Flagstaff	0·28
Insikeni	0·52
Port St. Johns	1·57
Umzimkulu	0·07
Do. (Strachan)	0·12
Tentkop (Elands Height)	0·47
Elton Grange	0·10
Ugie	0·32
Clarkbury (Engcobo)	0·74
Beersheba	0·00

NATAL.

	Inches.
Government Experiment Farm, Winkel Spruit	0·10
Cornubia	0·32
Saccharine	0·00
Milkwood Kraal	0·00
Blackburn	0·00
Observatory	0·00
Stanger	0·24
Verulam	0·02
Umbogintwini	0·06
Winkel Spruit	0·10
Port Shepstone	0·15
Imbizana	0·52
Umzinto	0·07
Bulwer	0·52
Richmond	0·24
Howick	0·05
Cedara (Vlei)	0·09

	Inches.		Inches.
Cedara (Hill)	0·05	Paulpietersburg	0·61
New Hanover	0·00	Ngomi Forest	1·90
Krantzkop	Nil	Ubombo	1·06
Greytown	0·15	Ngoma	0·93
Lidgetton	0·14	Hlabisa	1·23
Nottingham Road	0·05	Mahlabatini	0·33
Estcourt	Nil	Melmoth	0·16
Weenen	0·08	Empangeni	0·88
Mpofana	—	Mtunzini	2·25
Ladysmith	0·02	Himeville	0·17
Dundee	0·07	Point	0·09
Newcastle	0·50	Pietermaritzburg (Burger Street)	0·07
Vryheid	0·70	Giant's Castle	0·22

TRANSVAAL.

	Inches.		Inches.
Barberton	0·62	Arcadia	0·32
Komatipoort	0·40	Modderfontein	0·25
Bethal	0·13	Rustenburg	0·24
Christiana	0·32	Standerton	0·37
Carolina	0·30	Mbabane	1·32
Ermelo	0·52	Volksrust	0·72
Vereeniging	0·21	Wakkerstroom	1·08
Heidelberg	0·23	Potgietersrust	0·13
Lichtenburg	0·53	Krugersdorp	0·60
Pilgrims Rest	1·04	Joubert Park	0·58
Belfast	0·17	Observatory	0·24
Zeerust	0·15	Wolmaransstad	Nil
Middelburg	0·23	Pietersburg	0·34
Piet Retief	1·08	Louis Trichardt	1·08
Potchefstroom	0·28	Leydsdorp	0·36
Klerksdorp	0·71		

ORANGE FREE STATE.

BETHLEHEM DISTRICT:	Inches.
Abersethin	0·57
Kaal Laagte	0·66
Kestell	0·72
Middelpunt	0·63
Novo	0·73
Reitz	0·88
Whimburn	0·81

BETHULIE DISTRICT:	
Excelsior	1·29
Niet te Weet	1·38
Springfontein	2·29

BLOEMFONTEIN DISTRICT:	
Arboretum	0·97
The Government Laboratories	0·94
City Grey College School	0·88
St. Michael's School	0·93
Besters Put	0·93
Dewetsdorp	0·86
Donkerhoek	1·12
Doornplaat	0·97
Dunmanway	1·13
Ellerslie North	1·00

BLOEMFONTEIN DISTRICT (continued):	Inches.
Glen Lion	1·34
Hillandale	0·97
Mazels Poort	1·26
Pakpoort	1·16
Reddersburg	1·27
Retreat	0·89
Roodepoort	1·54
Kroomdraai	1·10
Tempe	1·35
Waaihoek	0·91

BOSHOF DISTRICT:	
Beginsildam	0·72
Brakfontein	0·89
Eagels Nest	0·84
Kanonfontein	0·75
Knapdaar	1·24
Mahemsvley	1·20
Smithskraal	0·45

EDENBURG DISTRICT:	
Bethany Village	1·64
Excelsior	1·83

FAURESMITH DISTRICT:	Inches.
Bergfontein	1·59
Brakdam	1·29
Klipnek	1·57
Koffyfontein	1·34
Kokshoeh	1·74
Newlands	1·77
Tevredenheid	1·61
Mimosa	1·58
FICKSBURG DISTRICT:	
Caledon Draai	1·18
Dekselfontein	0·51
Dunblane	0·75
Dunene	0·70
Gunton	1·28
Kalkoenkrantz	0·57
Platkop	1·25
Prynnsberg	1·45
Sandford	1·14
FRANKFORT DISTRICT:	
Town	1·09
Muirton	0·36
Dunedin	0·15
Vryheid	1·00
HARRISMITH DISTRICT:	
Africa's Kop	0·85
Arbeid Adelt	0·70
Buckland Downs	0·88
Tangjisberg	0·39
Forest Station	0·62
Kings Hill	0·48
HEILBRON DISTRICT:	
Brereton	1·08
Honing Kloof	0·81
Springbokvlaagte	0·87
Villiers	0·16
HOOPSTAD DISTRICT:	
Town	0·70
Farifield	1·08
Odendaalsrust	0·79
Roodepoort	0·34
JACOBSDAL DISTRICT:	
Town	1·34
Aschboschdam	1·12
Zoutpan	1·21
KROONSTAD DISTRICT:	
Town	0·85
Carisbrooke	0·79
Congleton	0·69
Geduldfontein	0·80
Gelukfontein	0·47
Holfontein	0·91
Vierfontein Mine	0·89

KROONSTAD DISTRICT (*continued*):	Inches.
Voorspoed	0·53
Waterford	0·75
Rodewal	0·69
LADYBRAND DISTRICT:	
Town	1·02
Alma	1·30
Barletta	1·03
Braemar	1·23
Clocolan	1·76
Government Nursery	1·01
Moria	0·90
Modderpoort	1·00
New Vale	0·76
Westminster	1·01
Zorgvliet	0·87
LINDLEY DISTRICT:	
Town	0·65
Kerry	0·75
Wexford	0·46
PHILIPPOLIS DISTRICT:	
Highbury	1·76
Krielsfontein	1·45
Langkuil	1·10
Orange	2·96
ROUXVILLE DISTRICT	
Town	1·13
Ben Avis	1·75
Clearwater	1·15
Middelplaats	1·86
Riversdale	1·85
Sterkfontein	1·25
Wheatlands	2·02
Zastron	2·14
SENEKAL DISTRICT:	
Vischgat	0·46
SMITHFIELD DISTRICT:	
Helvetia	1·70
Holstein	2·01
THABA 'NCHU DISTRICT:	
Town	1·49
Burgundy	0·83
Fort Basset	1·44
Leeuw River Mills	1·08
Moroka Industrial School	1·80
Mount Stephen	0·92
Ramalitsi	1·21
Rockwood	0·97
Strathearn	0·93
The Cliff	0·93
Tweespruit	1·03
Wilgeboom Nek	1·20

	Inches.
VREDE DISTRICT:	
Town	0·37
Woudzicht	0·55
VREDEFORT DISTRICT:	
Boduskraal	0·75
WEPENER DISTRICT:	
Lucerne Valley	1·39
Mon Repos	1·27

	Inches.
WEPENER DISTRICT (*continued*):	
Waschbank	0·83
Wonderboom	1·10
WINBURG DISTRICT:	
Town	1·07
Beddington	1·40
Burnet Holm	0·43
Hayfield	0·34
Paardekraal	0·78
Smalldeel	1·05
Vaalkankskuil	0·38
Foxhill	1·80

Departmental Notices.

FARM EMPLOYMENT.

MR. E. SHARRATT, Brakwal, P.O. V. K. Kop, District Harrismith, Orange Free State, has a vacancy for an apprentice on his farm, where both general and stock farming are carried on. Youngish lad preferred, and one not afraid to work. [6]

Englishman, 19 years old, recently arrived in this country, desires employment on farm. Is strong and healthy and used to hard work.—ERIC SMITH, P.O. Box 1432, Capetown. [6]

Scotch tenant farmer, with life experience of pedigree and prize stock, desires management of stud or stock farm, or to assist on large ranch. Especially desirous of getting into touch with person wishing to import Clydesdales. Eight years in Africa; retrenched from Government service; testimonials and references; age 45; not married.—Apply A. W. DORMAN, Wessels Nek, Natal. [7]

Applicant, married, age 40, desires situation as farm manager. Fifteen years' experience in Natal—stock and agriculture. Proficient in dairy work and management. Good references.—"C", P.O. Box 17, Potchefstroom, Transvaal. [8]

Scotchman, married, 28 years of age, eleven years' experience of mixed farming and wattle growing in Natal, desires situation as manager on farm.—R. G. H., c/o Lake Hotel, Mooi River, Natal. [8]

No. 1173.] [17th July, 1911.

TARIFF OF CHARGES FOR VACCINES AND OTHER LABORATORY PREPARATIONS SUPPLIED BY THE UNION VETERINARY RESEARCH LABORATORIES.

Quarter-evil or blackleg vaccine, blue-tongue vaccine, and redwater vaccine are supplied to the general public at the undermentioned prices. Full instructions are sent with the vaccine, so that *purchasers can carry out the vaccinations themselves*:—

Quarter-evil or blackleg vaccine for double inoculation, per double tube of 10 doses........ 2s. 6d.

For single inoculation, per tube of 10 doses........ 2s. 6d.

Blue-tongue vaccine is put up in bottles of four sizes, there being sufficient vaccine if carefully used to vaccinate the number of sheep stated, but *it is better to order a few doses more than the actual quantity required.*

Blue-tongue vaccine, per bottle, sufficient for—

12 Sheep........	1s.
24 Sheep........	2s.
48 Sheep........	4s.
108 Sheep........	9s.

Redwater Vaccine.—Special arrangements will have to be made for each particular applicant. The vaccine can only be obtained from Pretoria and Grahamstown Laboratories.

A supply of these vaccines will be kept at *the Veterinary Research Laboratory, Pretoria, P.O. Box 593* (telegraph address, "Microbe"); *the Veterinary Research Laboratory, Grahamstown* (telegraph address, "Institute"); *the Veterinary Research Laboratory, Pietermaritzburg* (telegraph address, "Bacteria").

Vaccines can also be obtained on application being made through the District Government Veterinary Surgeons of the Union, who will obtain the vaccine required and remit the money in payment to Pretoria, and will telegraph urgent orders, if required to do so, when payment is made for the telegram.

Vaccines are only issued for cash, and no orders will be accepted unless full payment is made in advance, or the vaccine can be sent by rail on C.O.D. system. Payment may

be made by cash, postal order, or cheque, but if by cheque the amount charged by the bank for commission must be added and the cheque must be initialed by the bank, otherwise the order will be held over until the cheque has been cleared.

Vaccine can be sent by rail on C.O.D. system, and should any order be received unaccompanied by a remittance, the Government reserves the right of using its discretion and of either dispatching the consignment C.O.D. to the nearest railway station or of holding the order until a remittance in payment is received.

Parcels cannot be sent C.O.D. by post.

All vaccines are sent railage or postage free to any address in the Union.

Syringes or other instruments cannot be supplied by the Department, but must be obtained through ordinary trade channels, but for the guidance of intending purchasers a list of merchants who have notified the Director of Veterinary Research that they supply suitable syringes and the prices at which these syringes are sold for cash will be sent on application.

All laboratory preparations are carefully tested before being sent out, but they are issued solely at the purchaser's risk. The Government cannot accept any responsibility for any losses or accidents which may occur from the use of these vaccines.

All previous notices and all regulations hitherto in force in any of the Colonies of the Union on this subject are hereby cancelled.

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A Hint to Correspondents.

An experienced contributor points out that it would be of great assistance in exchanging views through our correspondence pages if those who write would add to their addresses the name of the district and Province in which they reside. We should be very pleased to have this information in all cases and publish it, but it is difficult to induce some correspondents to give any address at all. For that reason a good deal of first-hand information is seriously delayed. The value of knowing where a correspondent is placed lies in the fact that it is some guide to the conditions by which he is surrounded. That in itself is frequently half-way towards the solution of many of the problems which arise in connection with most of the questions and difficulties propounded by our correspondents.

Wet Maize for Export.

The Chief Inspector of Grain has something to say in this month's issue on the subject of wet maize for export, and as that something is worth attention those interested should read it carefully. It is poor business to continue as some of those who have taken up this trade are doing. The whole case is so simple that it is almost incomprehensible how this wet grain is allowed to reach the ports in that condition. The Chief Chemist (Dr. Juritz) also offers some enlightening comments on the whole question which should help to convince the doubters. The mere fact that this shipping of grain containing too much moisture is calculated to react upon the interests of the whole export trade seems to have little influence with the careless ones. And not even the direct loss which many of them have sustained seems to have had much effect either. It is difficult to realize how it is possible to bring home to these people the injury they may be responsible for. Markets happen to be exceedingly favourable for the moment, but directly a drop takes place, and that must come before long, the careless handlers will feel the nip so sharp that they will be sorry they did not heed the official advice and earnest requests. Full particulars are given by Mr. Nussey of the methods of conducting moisture tests and the moisture testing apparatus now in use.

Imported Ayrshire Bull for Potchefstroom.

It may interest breeders of Ayrshire cattle in South Africa to know that the stud bull recently imported for the Ayrshire herd at the Government Experimental Farm, Potchefstroom, is "Foulton Sir Hugo", 8378, Vol. 34, bred by Michael Logan, Bargenoch, Drongan, Ayrshire. He is by "Bargenoch Baron Winter", 7168, and out of "Ruby of Bargenoch", Vol. 22, said to be the "very best blood" in Scotland, and of good milking strain. It is also particularly interesting to note that "Foulton Sir Hugo's" full brother, which was exported to America, was sold there by public auction for 520 guineas, the record price for an Ayrshire. In the Potchefstroom herd "Foulton Sir Hugo" now takes the place of "Nethercraig Merry Monarch".

Lamziekte Investigations.

Attention is directed to the list of questions published in this issue by Dr. Theiler in connection with the preparatory steps now being taken with a view to a complete investigation of the lamziekte or gal-lamziekte problem. Copies of these questions, printed in book form with spaces for the replies, are being circulated widely, and any one interested may receive one on application to the Director, Bacteriological Laboratories, Onderstepoort, Pretoria. The history of this obscure disease seems to be one of baffling confusion, and its investigation promises to be most interesting. Several attempts have been made by the veterinary staff of the Cape Province under the direction of the late D. Hutcheon, for so many years Chief Veterinary Surgeon, and latterly Director of Agriculture, but all that could be ascertained was that a ration of bonemeal and salt acted as a palliative. In the later efforts some indications were obtained pointing to the presence of a specific causative organism, but this was not followed up, so that practically speaking the field is quite open to the investigator to start afresh. Mr. Hutcheon's well-known theory that the onset of the disease was due to a lack of phosphates in the soil and herbage of the districts affected has been much discussed and is accepted by many, hence the bonemeal theory. But, unfortunately, the gradual spread of the disease by what appears to be some form of infection throws doubt upon the finality of this view. There must be a great deal of undiscovered evidence on this subject scattered about among the farmers of the affected districts if only those who have made their homely observations could be induced to speak. It is with this object in view that Dr. Theiler has issued his little question book, and it is to be hoped that this simple form of gathering evidence may be the means of bringing something to light which may be put to practical preventive use. The Bechuanaland farmers are taking the matter so seriously that they are putting up a special fund to devote to research purposes. So excellent an example deserves to be encouraged.

The Value of Chemical Fertilizers.

There are very few practical farmers with any desire to advance on the business side of their operations who are not more or less concerned with the purity and standardization of the commercial fertilizers which are now offered so freely throughout the Union. In the past

the purchaser has not always been able to make even fairly sure that he is getting value for his money, but with the adoption of legislation in the Cape Colony dealing with the subject this phase has largely disappeared. So far the other Provinces of the Union are without this form of control, but the existence of the law in the Cape has enabled the Acting Chief Chemist to publish in this issue a report which should serve to help all interested in differentiating between the varying qualities of the most commonly dealt in brands. A perusal of the article will also show the many difficulties which have to be overcome in handling official labours of this description, more particularly at a time like the present, when we are in a transition stage with its consequent lack of co-ordination of work. However, enough has now been done in the Cape under the special legislation in vogue in that Province to fully justify the extension of that law to the whole of the Union. The use of chemical fertilizers must increase in South Africa if we are to continue to follow the policy of more and better production. In many of the districts nearer the coast where the cost of these commodities is fairly reasonable their consumption has reached quite respectable figures, and now that the rail charges for inland consumers have been lowered, it is quite fair to assume that the farmers of the interior will also use them in greater quantities. The arguments in favour of a proper control of the supply of articles of this description need no stating, for after all the whole case is exactly on the same footing as an Adulteration Act. The advantages to the producer and the country generally are very great indeed, for they not only render production possible and profitable where these limits may have been exceeded—that is, of course, if intelligently applied—but these factors also add a great stimulus to further production.

The most gratifying feature of the report now published by Dr. Juritz is that portion which points out how the administration of this Act in the Cape Province has brought about a distinct improvement in the organization and control of the fertilizer trade. Now as this subject is of vital importance to the whole of the Union—for though the investigations apply nominally only to the Cape Province any user of fertilizers will be able to trace many brands commonly supplied all over the country—this improvement, which is reported to be continuous, must react favourably upon the whole of South Africa. It simply amounts to this that as the Cape Province is the largest consumer of this class of fertilizers it is very doubtful if it would pay importers to offer anything in other parts of the Union which would not pass the tests under the Cape law. It therefore follows that the very fact of the Cape insisting upon its fertilizers being properly standardized and equal in all respects to the stated specifications has helped the farmers in the other Provinces very considerably.

As this report contains much that is of very great interest to merchants and importers, as well as to farmers, it is to be hoped that it may receive full attention in the commercial circles interested. It must not be supposed that a deficiency in a fertilizer is necessarily due to any lack of care or interest on the part of the vendor. These things have to be imported, largely, and the merchant can only supply

that which he receives. It has also to be remembered that certain of these fertilizers are apt to deteriorate in transit or while being kept in store. It is to guard against these possibilities, quite as much as against any purposeful misrepresentation or adulteration, that investigations of this nature are necessary. As a matter of fact a properly administered Fertilizer Act is as much in the interest of the merchant as of the consumer, for it insists upon his supplying nothing but that which is as represented, and by thus assuring the supply of a sound article encourages the farmers to use as much as possible and to advance on thoroughly sound lines of development. This means, in turn, increased production, a larger national turnover, and in the end more business and more profit to all concerned.

South African Irrigation Association—Annual Congress.

The South African Irrigation Association has grown apace since that society was formed at Potchefstroom last year. Although irrigation farming has played so prominent a part in the development of South Africa—particularly in the Cape Province—the interests of the irrigators, as irrigators, have been left largely to the protection of parliaments and the law courts. The results have not always been ever happy, and it is hoped that the future may eliminate some of the troubles now that an organized body representative of the whole of the Union has been formed capable of giving first hand advice upon the many problems which the use of water in a dry land must always offer. The Association has been working quietly so far, trying to establish itself firmly before coming before the public eye too prominently, and in this it has succeeded, for it has now a very strong membership and an executive so thoroughly representative as to command the confidence of the whole of the Union.

The first work of importance undertaken by the Irrigation Association is the holding of its first annual conference, which is called to assemble in the Town Hall, Bloemfontein, on Thursday, 16th November, at 10 a.m. This will follow immediately after the annual Congress of the South African Agricultural Union, so that members of the one may attend the other without dislocating their business too seriously. The main item of the agenda, we learn, will be a full discussion of the Draft Irrigation Bill for the Union, which is to be submitted to the next session of Parliament. As there are no less than 136 clauses in this Bill, a satisfactory debate on it, if taken in detail, will occupy as much time as any ordinary conference can well spare. Among the other items promised are short papers on interesting subjects pertaining to irrigation farming and motions on general subjects which may be introduced by the members. All desirous of attending should apply to the hon. secretary, F. D. MacDermott, Department of Agriculture, Pretoria. Members are urgently requested to notify the secretary as early as possible if they intend to be present.

The Ostrich Industry in America.

A particularly well-informed correspondent at Washington, U.S.A., in the course of a letter recently received here, says: "I am strongly of the opinion that the South African people cannot

afford to maintain a policy of secrecy in ostrich culture matters. Arrangements are now in an advanced stage for co-operation between Algeria and this country for the experimental study of ostrich breeding and ostrich farming. This is further facilitated by the very elaborate investigations now being carried on by the Carnegie Institute on Long Island in the breeding of various domesticated birds. The principles worked out in the breeding of hens and pigeons can to a certain extent be applied to the breeding of ostriches. . . . So far as I know, ostrich culture is the only instance where South Africa has refused to co-operate with this country, and I hope that arrangements can be made to make this work co-operative in the true sense between the three countries most interested, namely, South Africa, the United States, and Algeria. Algeria now has fiscal independence of France, having its own budgets expended by its own local parliament. I have little doubt that ostrich culture will be developed in Algeria in the near future. Furthermore, we have new connections in Arabia by which it is possible to get some of the very choice breeds which have been imported from this part of the world which I believe have not yet been utilized in ostrich-breeding work."

Co-operative Seed Reports (Soy Beans and Mealies).

The following report on tests made by Mr. Peter Roux, Doornfontein, P.O. Box 86, Zeerust, with soy bean and mealie seed supplied by the Department of Agriculture, has been received by the Government Botanist:—*Southern Soy Beans* (10 *lb.*).—Of these 1½ lb. were planted in drills 2 feet apart on old, well-manured garden soil under irrigation on the 25th October, 1910. The beans grew splendidly, and were reaped on the 1st April, 1911, yielding a crop of about 60 lb. The rest (8½ lb.) was sown broadcast on dry land (red sandy soil) on 3rd October, 1910, and reaped on the 16th April, 1911, yielding 40 lb. These, however, suffered considerably from drought, hence the poor yield. In my opinion this kind of soy bean will do very well in these parts, providing we have a normal rainfall and the frost does not come too early. *Will's Gehu Maize* (20 *lb.*).—This was planted in 3-feet drills in well-worked red, sandy ground (dry land) on the 14th December, 1910, but on account of the drought the crop turned out a total failure. These mealies seem very sensitive to drought. *Chester County Mammoth Maize* (20 *lb.*).—This was planted in 3-feet drills in well-worked red, sandy ground (dry land) on the 14th December, 1910, and reaped on the 1st April, 1911, yielding a crop of ten (200 lb.) bags. This mealie is a beautiful yielder and a splendid drought-resister.

Cow Dung as a Remedy for Citrus Scale.

Mr. F. A. G. Liesching, Zwartberg, East Griqualand, writes:—"Seeing that we have a new citrus fruit scale introduced into the country, I would recommend the following remedy, which is well worth trying. Take a large bath or tub, into which put a quantity of soft, fresh cow-dung, add water, and mix until you have a soft mulch. Procure a shallow tin dish, say six inches in diameter, and splash the trees with this, first with an up stroke of the hand and again throwing overhand, until you have the leaves and stem well covered.

Do this after the fruit has formed. The dung wash forms a veneer, which smothers all scale and parasites. The first shower of rain causes the veneer to drop off, carrying all larvae and dead scale with it, and leaving the tree with a bright polished appearance."

The Acting Chief of the Division of Entomology supplies the following note on the above suggestion:—This remedy has been brought to my notice many times by farmers, and I believe that I first heard of it fully fifteen years ago. I have seen treated trees on a number of occasions, and can vouch for the treatment reducing the scale considerably, but in no case have I seen as good work done by it as I know a single spraying with resin wash or strong soap suds would accomplish. A great deal of scale unavoidably escapes the treatment and lives to propagate. A similar remedy is that of wetting the trees with a warm, thin solution of common laundry starch. The starch forms a film over the surface of the leaves in drying, and after a few days it peels off and brings many of the scales with it. Such remedies are so inferior to spraying with oily and soapy washes of repute that I never recommend them. It is better to make use of them, however, than to do nothing toward cleaning the trees.

Pig-Breeding: A Useful Importation.

We learn that Mr. Hermann Oppenheim, of Senekal, Orange Free State, has just imported from England a promising young Tamworth boar with which he intends to further improve his already excellent herd of pedigree Tamworth pigs on his farm Hillyside. This young boar, "Monarch", is sired by "Knowle Monarch", out of "Countess", by "Monmouth", out of "Charlotte", by "Charlie", out of "Dilton Stumpy". "Knowle Monarch" is by "Knowle Lord Cromer", out of "Knowle Ruby", by "Knowle King David", out of "Knowle Sylvia". "Knowle Monarch" was shown last season at the Bath and West of England, Royal Counties, Royal Agricultural Society of England, and Yorkshire shows, and won first prize on each occasion; indeed he was generally considered to be the best Tamworth boar seen in the showyards for some time. "Countess" is a grand, big, long sow, and was highly commended on this year's Royal; the young boar was commended at the same show. "Knowle Ruby" and "Knowle Sylvia" were prominent prize-winners, and "Dilton Stumpy" won the gold medal of the Royal Agricultural Society of England as the best of the breed. The young boar "Monarch", after having been kept in quarantine in Durban for a fortnight, arrived about the middle of September at Hillyside none the worse for his long journey. He is, we learn, a beautiful long animal with long deep sides, fine shoulders, tail well up, and is covered with a coat of golden red hair. He is a typical bacon pig and should leave his mark on the South African pig-raising industry.

Cotton-Ginning Facilities.

Owing to the difficulties experienced in ginning by hand-power plant, cotton growing is not making the progress which it otherwise might in South Africa, and, in view of this, cotton planters who are

cultivating in a small way will no doubt be interested to hear that the firm of Messrs. S. A. Nathanson Commandite, of Durban, have erected a large ginning factory in Durban. They either buy outright for cash any quantity and any variety of cotton ginned or unginned, or accept consignments to be sold by the British Cotton Growing Association, Manchester, and, if required, they advance cash against such consignments, whilst they also accept cotton for ginning and for shipping as per instructions. It is understood further that Messrs. Nathanson Commandite are the buying agents for the British Cotton Growing Association, and that all communications relative thereto may be addressed to them. Messrs. Nathanson Commandite's postal address is Box 261, Durban.

Apiculture in Africa.

Miss M. Ritchie, President of the Natal Bee-keepers' Association, writes on the attractive subject of bee culture:—

"Bee-keeping is a successful industry over the whole of South Africa", says a writer in "Bee Gleanings". That bee culture may become a successful industry over the whole of the continent would be nearer the truth. Within our boundaries we have the whole history of the subject—the evolution of bees as well as bee-keepers—for bees are still to be seen building their combs in the open sunshine, though for the most part they prefer the trunks of trees and the caves of the rocks. In French territory in Africa the natives (Kabyles) keep their bees in clay cylinders, a survival from the very earliest times. The Sahara is said to have its apiaries located on the oases, where the date palm is the leading honey plant; and Egypt keeps its bees as of yore when the Pharaohs ruled in the land.

The barbarous sulphuring methods of Europe fifty years ago are not unknown, and, on the whole, Africa is very much the "dark continent" as far as a scientific knowledge and treatment of the honey bee is concerned. That there should be so few bee-keepers is not the fault of the country—a country in which one can practically live in the open air—nor of its bees. Hundreds of wild swarms have their homes in the kloofs. From the early spring, when the bush trees blossom, through the heat of midsummer, the bees are busy, on until the autumn when the last veld flowers wither and the grass is burnt and bare. The honey is stored in lonely inaccessible places in the cliffs, sometimes resulting in magnificent "honey takes" and sometimes robbed by the natives, the honey being presented for sale at the white man's "kia" (home) a woeful mixture of honeycomb, beebrood, dust, and pollen.

Within recent years, however, there are signs of a better order of things. It has been abundantly proved that honey can be produced in this country that, in appearance and flavour, will bear comparison with the finest "extra grade fancy" of other lands. A country that has disposed of 14,000 lb. of imported honey in one year, which possesses a large honey flora and no winter worthy of the name, offers immense possibilities for apiculture. The foundation of

the Natal Bee-keepers' Association in 1908 and the Transvaal Association in 1909 (now the South African Bee-keepers' Association) has done much to advance the interests of bee-keeping in South Africa. Mr. W. C. Mitchell (Government Experiment Farm, Cedara) and Mr. W. J. Fuller, Maritzburg, Messrs. G. Cettle and A. J. Chesterfield, of Johannesburg, as hon. secretaries of these associations; Miss Sillar (Orange Free State), Miss Ritchie (Natal), Mr. Attridge (Cape Colony), and Mr. Sworder (Transvaal) as experts of the last-named association, have all done yeoman service. The work of educating members in a scientific knowledge of the bee, in the practical management of the apiary, in the use of up-to-date appliances, and in the importance of proper grading, packing, and marketing produce has gone steadily forward.

In view of the disastrous effects of foul brood disease in other countries, the associations united and secured Government legislation against the importation of foreign bees, wax, and comb. The recent unfortunate outbreak of the disease in Johannesburg has not found them unprepared and immediate steps have been taken to combat it if possible. Amongst other measures the immediate appointment of a foul brood inspector and foul brood advisory board is suggested; also compulsory registration of all bee-keepers and the keeping of bees only in movable frame hives.

It is true that in a country where plants grow well so also do weeds, and the honey bee is not without its enemies. On sunny days the tiny bee pirate is ever on the watch, and on dull days the African drongo, or drongo shrike (*Buchanga assimilis*) shadows the apiary with ill intent. The swallows, which are still more numerous, are also fond of honey-laden bees, while spiders, frogs, and lizards make them their prey. The praying mantis will sit in front of an alighting board and quietly nip up the bees, then assuming his characteristic attitude be seen saying his prayers—or is it returning thanks! In badly-made hives a species of cholifer or tick-like spider is often seen annoying the bees. It is not supposed to be harmful, but seeks parasites, mites, and ticks. Ants of all kinds are also a great source of annoyance. Most interesting are the stories told of the little honey guide (*Indicator indicator*), a dark brown bird about seven inches long with a golden yellow patch on the shoulder. This bird leads the native to the nest by enticing whistles and then awaits its share of the honey. If this is denied it is said to become revengeful, and leads the culprit into all sorts of snares. Any one, so ungrateful, we hope, should never be shown another bee nest.

Clearing Lime-Clogged Pipes.

The correspondence in the last issue on the above subject has brought several letters offering methods of clearing deposits of lime from pipes other than those then mentioned. The one, suggesting a solution of caustic soda, is published in the correspondence pages, but as two experienced farmers, men who are used to the conditions in which this kind of thing occurs most frequently, have written stating positively that deposits can quite easily be burnt out of pipes,

and such a method is undoubtedly more easily handled than any other yet offered, we give the whole system in the words of one of our correspondents who signs himself "Griqua" and writes from Griqualand West. "Griqua" says: "If the pipes are taken up, each length unscrewed, and laid, a dozen or so at a time, side by side, their ends supported on bricks so as to raise them six inches or so off the ground, the fire can be applied most successfully. This is done by packing dry cow dung or kraal fuel under, over, and around them (just as country blacksmiths do when heating wagon tyres). This fuel is then fired and allowed to burn out, and when the pipes have cooled down very little difficulty is experienced in getting the lime out. Heating the pipes till red hot causes the lime inside to crack and crumble, and if the pipes, when cold, are struck with a hammer the lime will become dislodged and can be shaken out by degrees. If, when the pipes are replaced, they are so arranged that *both the inlet and outlet* are kept a foot or so under water, so that no air has access to the interior of the pipes, I don't think there will be much trouble with deposits of lime on the insides of the pipes, as the lime is probably held in solution by an excess of carbonic acid which cannot escape without access to the air. A thin dribble of such water running through a pipe much too large for it would rapidly deposit its lime and clog the pipe, but if the pipes are kept full and the ends protected from the air as described, very little lime will precipitate. Possibly the water of the spring may have a high temperature. If so it would be as well to allow it to cool in a small dam or tank and thus force it to deposit most of the lime before entering the pipes."

A Clock Gun for Scaring Vermin, etc.

A correspondent has drawn our attention to what appears to be an effective, and decidedly novel, contrivance for scaring birds, rabbits, foxes, and other vermin in cultivated lands and elsewhere. This is an automatic self-acting "field clock gun" patented by Mr. Charles Millichamp (of Messrs. Millichamp & Son, Presteigne, Radnorshire, South Wales). The construction of the gun, it is stated, is simple, and the contrivance can be managed by a boy. It holds nine 16 pin-fire cartridges at one time, which can be set to fire at intervals from 15 minutes to 1½ hours, and can be set to fire a shot at any given hour during the night or early morning by winding and setting the night before. It should be well adapted to scaring birds, etc., and would thus be particularly useful to farmers, orchardists, and nurserymen. The gun can be had either with or without the figure of a man; the price of the former is £2. 12s. 6d. net, ot the latter £2. 2s. Special cartridges are obtainable at 4s. 3d. per 100, or a box of 250 cartridges, carriage paid in the British Isles, for 11s. 6d. These, of course, are prices in Great Britain.

South African "Mebos" Abroad.

The following extract from a monthly report of the Canadian Department of Trade and Commerce has been forwarded by the Acting Secretary for Commerce and Industries for the Union: Some

time ago Sir Harry Rawson, Governor of New South Wales, called the attention of the New South Wales Department of Agriculture to a table delicacy made in the Cape Colony called "Mebos", which he thought worth while experimenting with in Australia, and, lately, Miss Rawson obtained from the Cape a recipe for the process, which she forwarded to the Department. The recipe, which is given below, is well known in the Western Province of the Cape, and is very simple: "Take soft ripe apricots, lay them in salt water (about 2 oz. of salt to a quart bottle) for a few hours. Then lay them on a mat to dry in the sun; the next day press them between the hands to flatten and to let the stone come out. The next day repeat the process. At the Cape it generally dries and becomes 'mebos' in three or four days in the sun, but if the weather should be damp they might be dried in heated rooms or a cool oven. To crystallize the mebos lay them in lime water for five minutes till they feel nice and tender, take out, wipe dry on a soft cloth, and rub coarse crystallized white sugar well into each; take 1½ lb. of sugar to 1 lb. of mebos. Pack closely, with lots of sugar in between, in jars that will cork well." This is said to make a very nice sweetmeat, and is reported to be a remedy for sea-sickness. The lime water is made by adding two tablespoonfuls of fine lime to a quart of boiling water. This should be mixed well, and when the lime has drained to the bottom the clear water may be poured into a bottle, corked, and kept for use.

Apricot Paste in Damascus.

According to a Board of Trade report on British trade in Syria, the sale of the produce of the apricot tree, so extensively cultivated in the gardens around Damascus and in the valley of the Barada River, provides a very respectable revenue to native landowners. The fruit is of excellent quality, and is produced in such abundance that, after supplying local requirements and those of the neighbouring towns, large quantities are made into paste and are also dried, and in these two forms are exported. The operations of paste making and drying are done in the gardens and orchards, and begin about the end of May. In making the paste the stones are removed and the fruit is well kneaded until it has gained the necessary consistency; it is then spread upon boards and placed under trees and in shady places to dry. The boards are made in dimensions so calculated that the sheets of paste spread over them should, when dry, weigh 1 rotl, or two okes. When perfectly dry, the sheets, or leaves, of paste are carefully rolled up and brought into town and sold to regular dealers. The annual production of this paste is not less than between 3000 and 4000 tons, and the quantity is increasing yearly as new gardens are planted.

The paste is made in three qualities: First quality, clear yellow colour and large and thin leaf; price, 12½d. to 13½d. per 5½ lb. Second quality, dull colour and thicker leaf; price, 2d. to 2½d. per lb. Third quality, dark colour and fibrous paste; price, 1⅝d. per lb. The paste is largely consumed in the country, and is also sent to every part of Turkey and Egypt. Roumania takes a considerable quantity, and some finds its way to the United States. The leaves are rolled

and packed in cases of 30 rolls if sent to Egypt, and in 39 rolls (equal to 100 kilos.) if exported to Roumania. Exports of paste in 1908 were 1700 tons, valued at £25,000. This product is evidently the equivalent of the South African fruit paste or rolled fruit.

Apricot Kernels in Damascus.

The same report states that some 6500 tons of apricot kernels are exported annually to Marseilles and Hamburg, and some small parcels are sent to Genoa, Trieste, and sometimes to the United Kingdom. The prices in 1909 were 90 to 100 francs per 100 kilos., c.i.f. Marseilles or Hamburg. Exports of kernels in 1908 were 600 tons, valued at £20,000.

Durum Wheat.

Wheat farmers will be interested to learn that Messrs. L. Fatti & Co., of 32 Jeppe Street, Johannesburg, are importing seed of the renowned hard wheat, *Apulia durum*, and that orders are now being booked for this seed. Samples may be had on application. Messrs. Fatti & Co. are interested in the extension of durum wheat growing, as they are the proprietors of the South African Macaroni Factory, for which large quantities of hard wheat are required, and they have taken this course of importing seed direct from Europe in order to encourage the growing of this particular kind of wheat in South Africa.

Post-Mortem Examination on an Ostrich.

By Wm. Robertson, M.R.C.V.S., Acting Assistant Director of Veterinary Research.

Several breeders, and ostrich farmers generally, have so frequently written for information *re* cause of death in birds, and asking if such an organ were normal, that the writer has felt that a few notes on the appearance of an ostrich's body in the state of health and the best way to make a post-mortem on a dead bird might be of use to the readers of the *Agricultural Journal.*

Ostrich farmers make far too few examinations of their dead stock, and very few indeed have ever killed and opened a bird simply to see what the guts and stomach looked like in a state of health. (It is not necessary to kill a bird to do this; they commit suicide so frequently that ample opportunities for such post-mortems are generally forthcoming.) If a bird is found dead a careful examination should be made of the position in which it is lying, and if there is evidence of any struggle, any signs of discharge from mouth or anus, should be noted.

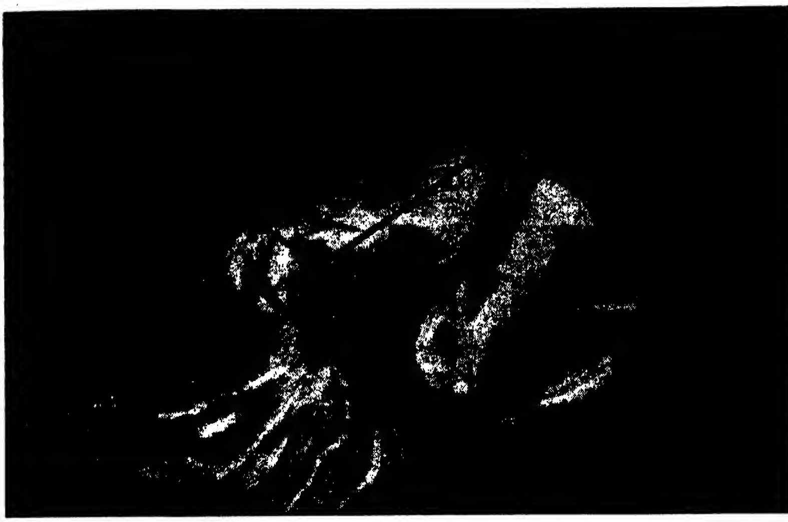
In commencing the post-mortem, the bird should be laid on the centre of the back (Fig. I), with the neck and head pulled straight out. The operation will want the following tools: a sharp knife, a pair of coarse scissors, and a saw or small axe.

On looking over the carcass of the bird it will be at once noticed that the conformation of the ostrich differs from that of all our other domesticated birds, and in fact from most birds generally, particularly in the structure of the breast, which is quite destitute of flesh, and is continued right forward in front of the bird and forms a complete box-like protection to the heart and lungs. Most birds are flyers, and as such have the powerful wing muscles continued into the chest, forming what at table we call the " breast meat ", but as the ostrich is purely a runner all the muscle in his body has gone into the high, powerful thigh muscles.

With the knife slit the skin from the front of the breast to the anus (being very careful when passing over the belly to cut only the skin, not the thin sheet of muscle), strip off the skin down the sides, and when the thigh joint is exposed just disjoint it by cutting the white ligament which, like a string, ties the leg to the body. The legs will then fall away from the body and act as a support to the trunk in further operations. Continue the skinning until the wing joints are exposed, and remove them at the joint. The ribs on each side of the flat breast-bone must now be cut through with a saw, or in the case of a young bird a knife will do, and very carefully the skin covering the abdomen must be slit, so when we remove the breast-bone and reflect the abdomen skin the whole viscera of the bird is neatly exposed for inspection (Fig II).

In a healthy bird we find the abdomen or belly lining to be of a black shiny colour, and the coils of the gut in sight are free from any

Post-Mortem Examination on an Ostrich.



Ostrich in Position for Post-Mortem. Line marks Site of Incision.

A—Intestines. B—Stomach. C—Liver. D—Heart.

tinge of redness or inflammation. We can also glance at the position of the huge stomach, half concealed beneath the other gut. At this stage I generally remove the contents of the belly for detailed examination as follows:—It will be seen that the cavity which contains the lungs is separated from that which contains the guts by a muscular wall or partition, called the diaphragm or midriff, and that through this passes the gullet, from the mouth to the stomach; cut this gullet on the gut side of the diaphragm—this releases the stomach; the whole belly contents can now be removed, and the last gut cut as it enters the pouch at the anus, called technically the *cloaca*.

The stomach in the ostrich (Fig. IV), it will be noticed, differs from the digestive apparatus in the fowl. The former has no crop, the crop and gizzard in the ostrich are practically joined, and in one; the upper part of the stomach corresponds to the fowl's crop, the lower to the gizzard.

In a state of health an ostrich's stomach is generally full, and in slitting it open the upper part will be found to contain food undigested, while the lower half contains about a quart of pebbles, etc., employed to grind the food. Note the different thickness of the muscular coat, how thick and strong it is over the gizzard part where the food is ground.

Slit open the organ and note that the lining is of two separate and distinct kinds, and that the line of difference is very sharply marked. The membrane at the upper part next the gullet is soft, sticky, and covered with small openings or holes; these are the openings of the gastric glands, from which the gastric or digestive juice is secreted, and it this upper part of the stomach which is the habitat or home of the ostrich wire-worm (*Strongylus Douglassii*), and here we must look for that pest. Generally when the bird is affected with the parasite we find this upper part of the stomach covered with a more or less thick skin or paste, about the consistency of flour paste; this is due to the irritation set up by the worms, and is thrown out by the stomach glands as a sort of protective covering. We now scrape off this paste, which gives rise to the Dutch description *Vrot Maag*, and under it we find the parasites. These are very small, red worms, about one-quarter of an inch long, and as thick as a very fine hair; they are sometimes so numerous as to give the stomach surface quite a red colour. It must be remembered that it is useless to search for wire-worm in an ostrich which has been dead for any length of time; almost as soon as the bird is dead the gastric juice commences to act upon the worms, and speedily dissolves them up.

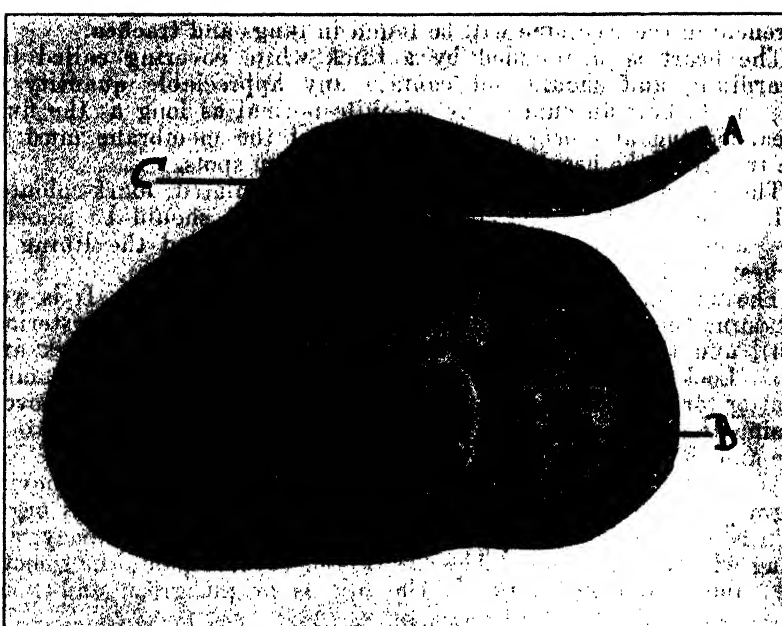
The lower half of the ostrich's stomach is lined with a membrane like a brayed skin. This strength is necessary when we consider the work done by this organ in grinding the food and foreign articles frequently swallowed by birds.

From the stomach we pass into the gut called the *small intestine*, and then on into the *large intestine*, 51 feet in all. Notice the two curious blind pouches communicating with the gut on each side; these are the fully developed organs which man has in the rudimentary stage, and known as the *vermiform appendix*, inflammation in which produces "appendicitis".

The gut should be slit up and examined for worms and other parasites; the dung should be gently scraped off the lining membrane, then washed. In health the colour should be a pale drab or light

Post-Mortem Examination on an Ostrich.

A—Testicle. B--Kidney.



A—Entrance to Stomach from Gullet.
B—Exit into Intestines.
C—Site of Wire-Worm.

French grey. Look for any redness or inflammation and observe if this redness is in broad areas or small patches. Examine the pouch at the end of the gut; this usually contains a quantity of thick white urine. The ostrich, like all birds, has one common opening for the gut, the urine, and for generative purposes. Sometimes the deposit from the urine becomes quite solid, and may have to be removed by hand.

We must now direct our attention to the other organs of the body, but before leaving the stomach we should look at the spleen or milt. This is quite unlike that organ in our other domestic animals, and consists of a small round firm object not unlike a small kidney in shape and size, adherent to the upper side of the stomach wall. In health this gland should be firm in consistency, and dark brownish-red in colour. In *miltziekte* it becomes very soft, semi-fluid in fact, and the colour of tar. In such a case a smear should always be taken on a piece of glass and sent in to one of the laboratories for diagnosis. I find miltziekte much more common amongst ostriches than one imagined, and I now employ with much success the Anthrax vaccine issued by the laboratory.

From the spleen we now proceed to the contents of the chest cavity; these are the heart and lungs. As I mentioned before, these organs are separated from the gut by a partition called the "diaphragm". If the chest has been removed in accordance with instruction the organs in question will now be fully exposed.

The lungs should be of a bright salmon pink colour, and closely adherent to the inside of the ribs. They should be clean on section and free from any trace of matter or blood. Often in birds choked by drenching the medicine will be found in lungs and trachea.

The heart is surrounded by a thick white covering called the pericardium, and should not contain any appreciable quantity of fluid; up to half an ounce may be quite normal as long as the fluid is clear-looking and bright. The inside of the membrane must be quite free from the heart, smooth, and free from spots.

The heart is generally full of well-coagulated, dark-coloured blood. The heart muscle, both inside and out, should be smooth, shiny, and free from spots or red discolorations, and the lining of the chest itself must be the same.

The wind-pipe should be free from froth, and clean. It is well to examine the back of the throat for choking (in cases of mysterious death), and the skin should always be removed from the neck and head. Look up the former for bruises and stick marks, and examine the latter for signs of blows. The top of the head can now be removed, exposing the brain; look for blood clots, etc. The healthy brain is white and the surface marked with blood vessels.

We must now return to the carcass of the bird. After removing the guts we find the liver occupying its usual place, and this organ should be of a bluish-brown colour, hard, and firm in consistency, and cutting with a clean edge. The covering or capsule should be smooth. shiny, and free from marks. The bile is bright green and small in amount.

Lying in a fold of membrane on each side of the backbone are (in the case of the male) the testicles, the left further forward than the right. The testicles vary much in size; if the bird is red and pairing "up" as the breeders term it they may be the size of a man's fist, and when off pairing they shrink to the size of a Mauser bullet.

In the young bird they are bright yellow, and in the bird which has mated they are harder in consistency and brownish-grey in colour.

If the bird we are opening and examining is a female we will find the egg sac and tube lying to the left side. In a full-grown hen, or one in the laying season, we may find eggs in all stages, from the complete shelled specimen to germs the size of a millet seed. If the egg-tube or oviduct is slit open the lining membrane should be creamy-white and with a clean surface. As this membrane gives the shell to the egg passing down it, we will find the surface red and inflamed when a hen laying soft-shelled eggs.

Close into the back, and lying in two hollows in the bone, are the kidneys, very different in appearance from those of other animals. In health they are dark coffee-coloured and granular in structure; often white chalky specks may be noticed, the result of inflammation, due to forcing the bird on too rich food, and sometimes I think from too frequent dosing with turpentine, which drug is excreted by the kidney.

Summary.—In making a post-mortem on an ostrich, look for any signs of injury either by man, other animals, or as the result of the bird's own stupidity. Then search for parasites and any trace of inflammation of the bowels. Look at the spleen for miltziekte, then the liver, see the heart and lungs, then the testicles, and spleen in the female; the examination of the ovary will complete the business. The illustrations explain themselves.

Wet Maize.

By G. F. Nussey, Acting Chief Inspector of Grain.

The present maize export season has been an exceptional one in several respects. In the first place a greater acreage was sown down to mealies than ever before, and had the crop yielded as much as in former years a record would have been established, but, unfortunately, owing to drought during the growing season and late and heavy rains, the mealies pollinated badly, with the result that it is not anticipated that the exports will reach anything like the figures of the previous year.

In consequence of the rains at the latter part of the season, wet maize was railed for export in large quantities, and, for a while, it looked as if the trouble with the European buyers experienced in 1909, when heavy shipments of South African maize arrived in Europe damaged, was likely to recur. Fortunately, however, moisture testers had been installed at each of the ports, and it was possible for the graders to discriminate, though not a few persons suffered serious loss as a result of the rejection of a large proportion of the grain sent to the coast for export.

I should just like to point out to the growers the losses they suffer by railing wet maize for export. When maize is rejected by the grader it has to be carted away from the wharf sheds, dried, and then again offered for export, and this may cost anything up to 1s. 6d. per bag, as against 2d. or 3d. if the maize were dried on the farm; and secondly, maize which has once been rejected on account of excessive moisture cannot be granted a clean export certificate, because of the damage which would be done to the South African grain trade if the Government were to issue first class certificates in respect of damaged grain which has been restored to condition.

In order that farmers might be aware of the damage they would sustain if they persisted in railing damp grain, several extended tours were made through the mealie-growing districts at the commencement of the season. My first visit was paid to Heilbron and Frankfort, where I discussed matters with many growers and produce agents, warning them of the trouble that would ensue unless pains were taken to see that no unfit grain was railed. At the beginning of August I visited Bethal, Kinross, Leslie, Springs, Standerton, and Platrand; and a little later in the same month another visit was paid to the Free State, and warnings given to the dealers at Kopjes, Kroonstad, Lindley Road, Kaallaagte, and Bethlehem.

There have been one or two complaints this year that the Government did not take the late rains into consideration and grant certificates for maize containing more than 12 per cent. of moisture. This, of course, it was impossible to do, because the amount of moisture allowed is not based on anything else but the condition of the grain

when it arrives in Europe, and experience teaches that maize containing more than 12 per cent. of moisture will not reach Europe in a cool and sweet condition. The result of the supervision exercised by the Government is reflected by the high prices realized in Europe for South African mealies.

I was talking this matter over with a prominent Capetown merchant a short time ago, and he informed me that he had received a cable from Europe to say that his first shipment for the season had arrived in splendid condition; and this is the kind of report the Government would like to obtain for all our products.

In order to give some idea of the amount of wet maize dealt with it may be stated that during the present season to date (31st August, 1911) 154,433 bags of maize have been exported from all ports, while approximately 70,000 bags have been rejected on account of excessive moisture or mustiness. The figures dealing with wet and musty maize have been dealt with as a whole because it is evident from the reports obtained from the graders that wet maize railed to Cape ports is usually more or less musty on arrival, whilst wet maize railed to Durban does not have time to become musty before it is examined, owing to the shorter railway journey. I should like to add, however, that in one or two cases it appeared that musty maize had been carefully dried before being railed; needless to say such grain was immediately rejected.

From returns to hand it appears that wet maize was dispatched from eighty-eight railway stations, namely:—

From 34	stations	in the Transvaal...	28,710 bags.
,, 37	,,	in the Orange Free State	34,963 ,,
,, 17	,,	in Natal	3,464 ,,
			67,137 bags.

Dealing with particular areas, the following are the stations from which the bulk of the damp grain was railed, showing quantities in each case:—

Bethal	5278 bags.
Standerton	4721 ,,
Heilbron	4521 ,,
Lindley Road	3730 ,,
Val	3385 ,,
Coalbrook	3093 ,,
Aberfeldy	2898 ,,
Bethlehem...	2399 ,,
Treurfontein	2320 ,,
Roodewal	2196 ,,
Harrismith	2175 ,,
Holmdene	1896 ,,
Kinross	1872 ,,
Kestell Road	1770 ,,
Vereeniging	1573 ,,
Tiger River	1533 ,,
Cedara	1500 ,,
Davel	1475 ,,
Vinies	1250 ,,
Platrand	1243 ,,

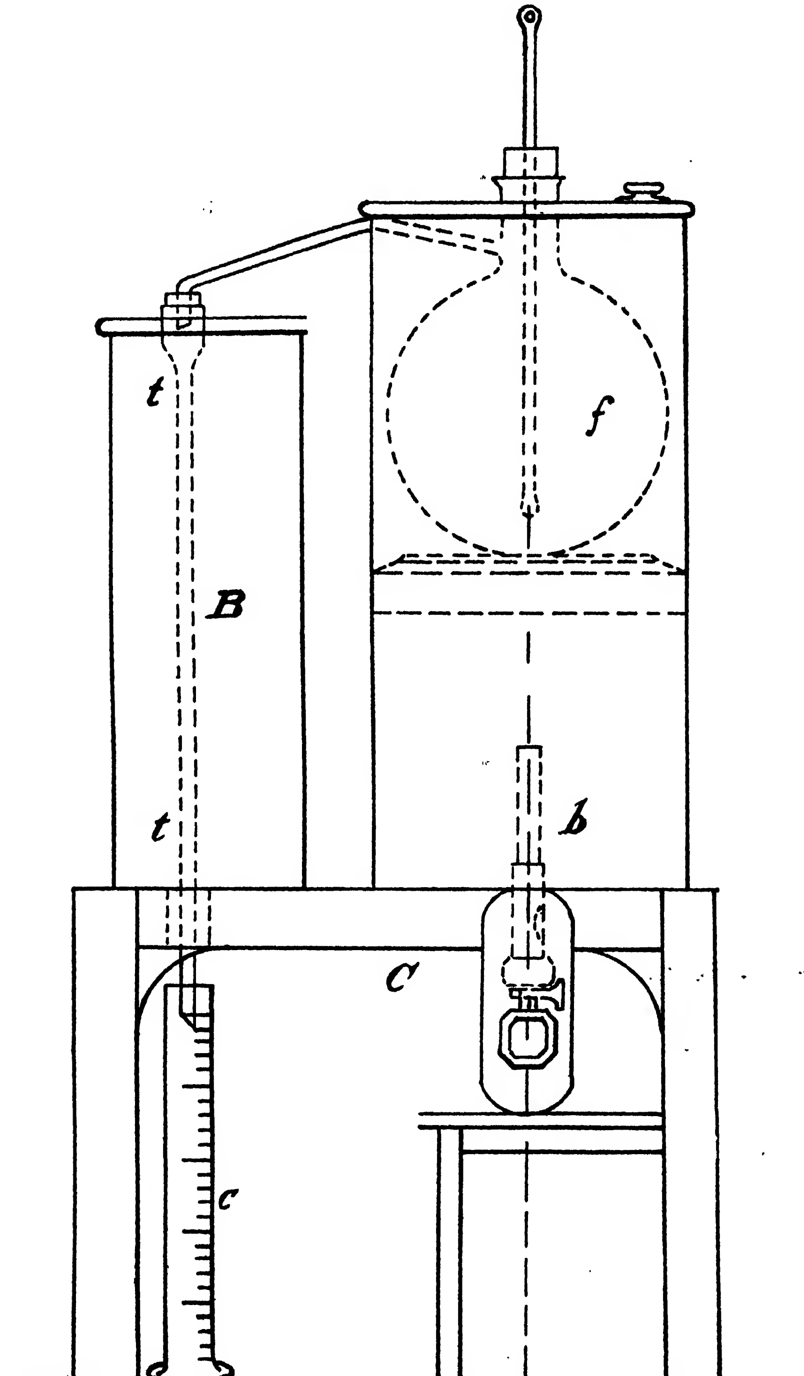


Fig. 1.

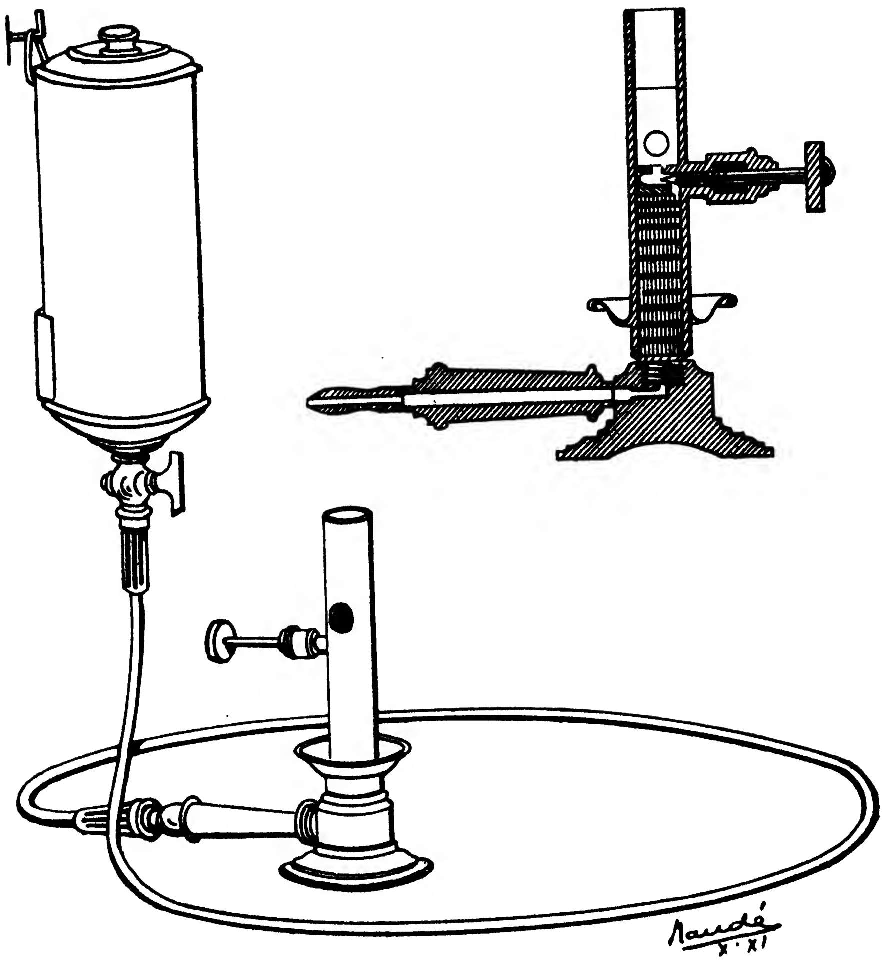


Fig. 2.

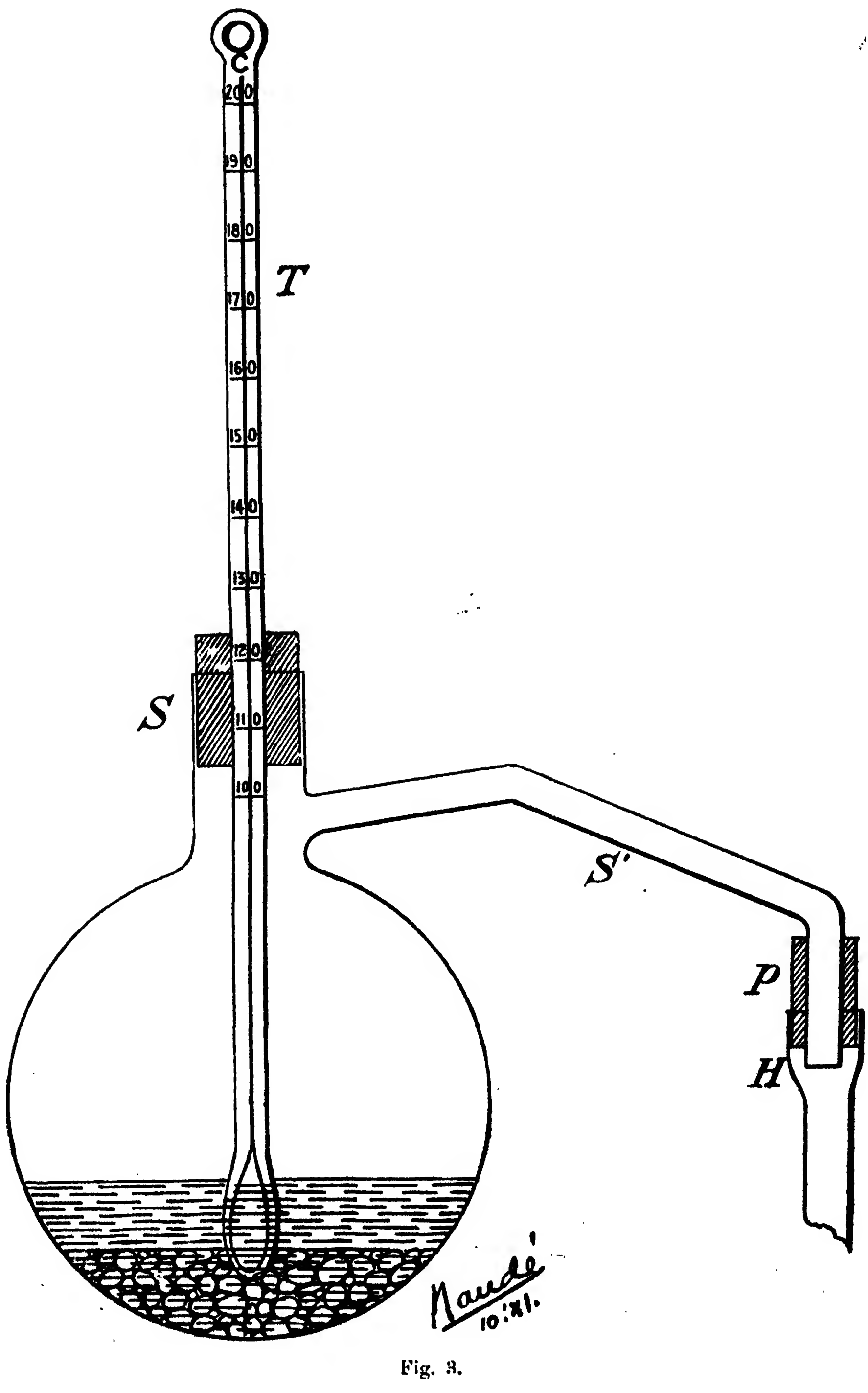


Fig. 3.

When the first rush of wet maize started at the ports, a limited number of tests were carried out in my office, free of charge, before the maize was railed, in order to avoid congestion at the ports. It has now been decided to continue making tests for exporters, but a charge of 3d. per sample will be made to cover the cost of the materials used. Whilst this privilege may prove serviceable to small shippers I cannot too strongly urge upon large producers and exporters the desirability of purchasing testers for their own use.

A description of the apparatus used by the Government will probably not be out of place. The grain is placed in a glass distillation flask (Fig. I, f) and covered with mineral oil. B is the tank containing cold water through which the condensing tubes (t) pass. C is an iron support for the evaporating chamber, and (c) is the measuring cylinder which receives the moisture after condensation. The alcohol lamps supplied by the manufacturers for use with the testers were found to be unsuitable, as the intense heat caused the spirit to catch fire within the reservoir, and they were therefore replaced by bunsen burners of the type shown in Fig. II, which are capable of regulation and serve the purpose admirably.

To make the test 100 grammes of whole mealies are placed in the distillation flask and covered with 150 cubic centimetres of engine oil, the flask being shaken so that the grain and oil are thoroughly mixed. The flask is then closed with a rubber stopper (Fig. III, s), which carries a thermometer (Fig. III, T). The thermometer is so inserted that four-fifths of the bulb are submerged in the oil. The flask is then placed in its compartment in the evaporating chamber and covered in; the side-tube (s^1, Fig. III) is connected by a perforated rubber stopper (p) with the thimble (h) of the condensing tube. The graduated measuring cylinder is placed under the lower end of the condenser tube and then the lamp is lighted, the flame being so regulated that a temperature of 190° C. is reached in twenty minutes. The flame should be extinguished immediately the thermometer registers 190° C., and the reading may be taken six minutes after the lamp has been put out. A small quantity of vegetable oil will be seen floating on the top of the water, and the reading should be taken along the bottom of the curved surface of the oil. 100 grammes of grain being used, 1 per cent. of moisture should be read for each cubic centimetre of water in the cylinder. Care should be taken to employ suitable oil for boiling the grain in; it should have a high flash-point and should be tested before use in one of the distillation flasks to make certain it contains no water.

The testers can be obtained in varying sizes, from two compartments upwards. The cost of a two-compartment Brown Duvel tester is about £11 f.o.b. New York, lamps extra. The manufacturers are the Kny-Scheerer Company, 404 West Twenty-seventh Street, New York (local agents: Messrs. Arkell & Douglas, Port Elizabeth and Johannesburg), and Messrs. Thos. Robinson & Sons, Rochdale, England. The lamps recommended are Barthel's Onixbe bunsen burners (for spirit), and can be obtained from any wholesale chemists, or probably from the manufacturers of the testers.

There is one other point to which I wish to refer, and that is the grading at the ports. Of late reports have appeared in the Press to the effect that the grading at one port differs from that at another, and that some of the graders are stricter than others. It may be

stated that there is no truth in these reports; the graders are whole-time Government officers, and the instructions to all graders are identical; the system of grading and testing for moisture is the same; and from frequent personal inspection I am satisfied that conditions are uniform so far as grading is concerned.

Changes in Moisture Content of Maize during Transit to Seaports.

By C. F. Juritz, M.A., D.Sc., F.I.C., Acting Chief of Division of Chemistry.

In his article on "Degree of dryness of maize required for safe shipment", printed in the *Transvaal Agricultural Journal* of April, 1910, page 458, Mr. J. Burtt-Davy remarked that maize may contain on arrival in London from 12.5 to 13.5 per cent. of moisture and yet remain perfectly sound and sweet, but he adds:—

> As it may gain from 1·5 to 3 per cent. of moisture in transit, it should not contain more than 12 per cent. of moisture when it leaves our ports.

In support of this statement, Mr. Burtt-Davy quoted eleven instances of shipments of maize in which moisture determinations had been made by the Natal Government before leaving Durban, and again by Dr. Bernard Dyer after arrival in London. In each of the eleven cases there was an *increase of moisture* between Durban and London, and this increase ranged from a minimum of .02 per cent. (in the case of a maize which on leaving Durban contained as much as 16 per cent. of moisture, and therefore could hardly be expected to absorb much more moisture) to a maximum of 3.03 per cent. (in the latter case the maize contained only 9.5 per cent. of moisture when it left Durban).

The moisture gains above recorded, it must be clearly explained, have not the least reference to the journey from inland districts to the South African coast ports; they refer entirely to the sea voyage from one of those ports—Durban—to London. Whether they will be as great, or greater, or less, on a voyage from *other* South African ports are as yet uninvestigated points. In Circular No. 55 of the United States Bureau of Plant Industry (quoted in my article on "Moisture in Export Maize" in the *Cape Agricultural Journal* of September, 1910, page 279) it is shown that the heating of maize increases correspondingly with the number of days on shipboard over a period of from thirteen to fifty-five days, and therefore, other circumstances being similar, more heating is to be expected in a longer than in a shorter sea voyage.

Another phase of the question concerns the transport of the maize across the sub-continent from the place of production to the coastal ports.

Mr. Burtt-Davy in his article records that—

> Sound dry samples of Transvaal maize may contain as low as 11·5 per cent. of moisture on arrival at Durban, but on exposure to the atmosphere on the Durban wharf for only a week, they may gain 3 to 3·5 per cent. moisture, which is sufficient to bring them up to the danger point for export.

Information is not available as to the proportion of moisture which those samples of maize contained at the time of their leaving the Transvaal for Durban, but during February of the current year

steps were taken to acquire some data with regard to the moisture changes in maize on the journey from the Transvaal to Capetown and during subsequent storage at the latter place. With this object in view the steps detailed below were adopted.

Five bags of maize, numbered serially from one to five, were dispatched by passenger train to Welverdiend Railway Station, and there transhipped to a truck which was full of maize. Under these normal conditions the five bags, which had a gross weight of 1030 lb., were dispatched to Capetown—a distance of 900 miles—on the 25th February. On arrival at Capetown Docks the five special bags were placed in the ordinary grading shed there and treated exactly as though it were intended to export them oversea.

Before leaving Welverdiend, samples were taken from each of the five bags, and moisture determinations were made in them by Mr. H. J. Vipond, B.A., Assistant Chemist of this Division at Pretoria, by means of the Brown-Duvel Moisture Tester, described in my article above referred to. He thus obtained the percentages recorded in the second column of the table below.

During the journey from Welverdiend to Capetown the five experimental bags were uppermost in the truck load of maize, and the truck was covered with a tarpaulin sheet in the ordinary manner. The sampling and subsequent moisture determinations were entrusted to Mr. E. V. Flack, F.C.S., Analyst of this Division at Capetown.

The first samples at Capetown Docks were taken on Monday, 6th March, the day of the arrival of the maize, subsequent sampling being performed on the three successive Mondays, and finally on Wednesday, 12th April. The sampling was in all cases performed (both at Pretoria and Capetown) by thrusting an ordinary maize sampler into the bag as far as it would go. The maize was apparently quite sound on arrival at Capetown, but on the 27th March the bags were discovered to be considerably weevil-infected, Bag No. 3 being less so than any of the others. The results obtained by determining (by means of the Brown-Duvel tester) the moisture in the maize as sampled on the dates mentioned are tabulated below.

Sample Number.	At Pretoria.	In Shed at Capetown Docks.				
	25th February.	6th March.	13th March.	20th March.	27th March.	12th April.
1	11·2	10·35	10·00	10·10	9·80	9·65
2	10·0	9·60	9·95	9·90	9·25	9·85
3	9·8	9·20	9·30	9·20	9·30	9·30
4	11·9	10·60	9·95	10·20	9·90	10·55
5	10·2	9·25	8·95	9·40	9·20	9·77

The general tendency towards a higher moisture content on the 20th March is due to the fact that a wet penetrating mist prevailed on the 19th, and a somewhat similar, though less pronounced, tendency on the 13th March was concurrent with a sky absolutely covered with rain clouds both on that and the previous day. For the rest of the time that the maize was under observation the weather was dry and sunny.

In the shed where the bags were kept the temperature during the day was well below that of the external air, as may be seen from the following table, which gives observations taken (*a*) in the grading

shed at the Capetown Docks, and (*b*) in a Stevenson screen at City Hospitals a few hundred yards distant. The temperature is given in all cases in degrees Fahrenheit.

Date.	(*a*) Grain Grading Depot, Capetown Docks.		(*b*) City (New Somerset) Hospitals.		
	11 a.m.	3 p.m.	8 a.m.	Daily Maximum.	Daily Minimum.
March 13	—	68·0	62·0	70·5	59·0
„ 14	69·8	72·5	64·0	76·5	68·0
„ 15	72·5	78·8	65·6	86·5	60·0
„ 16	71·6	77·0	70·2	84·5	62·2
„ 17	76·1	86·9	65·4	92·2	59·0
„ 18	81·5	—	80·2	91·3	63·0
„ 19	—	—	59·7	75·0	59·0
„ 20	72·5	77·0	61·3	79·0	58·8
„ 21	66·2	66·2	56·6	66·8	56·0
„ 22	68·0	73·4	56·0	69·9	52·8
„ 23	71·6	75·2	64·0	81·2	55·5
„ 24	82·4	86·9	59·4	91·0	54·5
„ 25	78·8	—	59·5	97·3	57·0
„ 26	—		66·8	70·6	59·2
„ 27	71·6	75·2	58·0	70·0	58·0
„ 28	68·0	71·6	58·8	67·5	57·5

In all the above determinations the method adopted was that described in my former article in connection with the Brown-Duvel Moisture Tester, 100 grammes of whole maize being immersed in 150 c.c. of cylinder oil, complying with the requisite specifications, and the mixture heated to 190° C., the evolved moisture being condensed in a graduated measuring tube.

Check determinations were made by drying 10 grammes of the maize, after grinding to a very fine state of division, in a steam oven for three hours, allowing the residue to cool in a desiccator and then weighing. In this way the following results were obtained:—

Sample Number.	6th March.	13th March.	20th March.	27th March.
1	10·84	9·89	9·66	10·36
2	9·50	9·25	9·44	9·61
3	9·51	9·48	9·62	9·69
4	10·39	9·73	10·33	10·69
5	9·54	9·32	9·28	10·01

A third series of check determinations was commenced but abandoned owing to the obvious unreliability of the method. The figures obtained thereby are nevertheless given below. They comprise only those of the samples taken at the Capetown Docks on the 6th March:—

Sample Number.	Percentage of Moisture.
1	1·36
2	·86
3	·84
4	2·37
5	1·38

These last determinations were made by drying 50 grammes of whole maize grains in a calcium chloride desiccator for four days.

In the Pretoria Laboratory comparative determinations were made a year ago by each of the three methods above described, and the following figures were obtained, all, of course, from one particular sample of maize:—

Moisture determined from whole maize in an improvised Brown-Duvel Tester, 10.60 per cent.

Loss on drying ground maize in a steam oven, 10.15 per cent.

Loss on drying for four days in a calcium chloride desiccator, 4.38 per cent.

These tests also show the unreliability of the calcium chloride method. Mr. Vipond, however, made some further experiments with three samples of maize, which were all exposed for six days to the drying action of anhydrous calcium chloride, in two cases after previous exposure for some hours to a moist atmosphere, namely a solution of calcium chloride. The following results were thus obtained:—

Number.	Per Cent. Moisture gained in Moist Atmosphere.	Per Cent. Moisture lost on drying over Calcium Chloride.	Net Percentage of Moisture lost.
1	4·94	8·78	3·84
2	4·34	8·32	3·94
3	—	3·78	3·78

It is, of course, highly unlikely that the figures in the last column indicate all the moisture that the maize samples contained, and the unreliability of that method being thus apparent no further use was made of it, and subsequent determinations were performed only by the steam oven and Brown-Duvel apparatus, preferably the latter.

Inspection of the foregoing tables clearly show that, notwithstanding the fluctuations in the moisture content of the stored maize corresponding with the fluctuations of the weather during the early days of winter, there was a distinct *diminution* of moisture content in every case except that of bag No. 2 during the five weeks that the bags remained in the grading shed at the Capetown Docks. Averaging the moisture content of all the five sample bags, they ranged as follows:—

	Per cent.
25th February (Pretoria)	10·62
6th March (Capetown)	9·80
13th March (Capetown)	9·63
20th March (Capetown)	9·76
27th March (Capetown)	9·49
12th April (Capetown)	9·82

The Classes of Maize Best Suited for the European Markets.

By C. du P. Chiappini, Trades Commissioner for South Africa.

Neither I nor any one else can say with any degree of certainty which breeds of maize are most suitable for the European markets if it is to be understood that the maize is to be produced in South Africa, for there are many important matters to be taken into consideration. First from the *market point of view* we have to consider which classes of maize are most in demand or are likely to be so in the future. To enable us to consider this feature of the question we have to take into consideration the uses to which different classes of maize are put by the buyers, and even then it will be necessary from time to time to follow closely the requirements and demands of the markets; these fluctuate not only in so far as the general maize trade is concerned, but also as to the different classes in accordance with the demands of the different consumers and manufacturers of maize products.

Then in so far as the *producer* is concerned, we must consider what classes of maize he can produce most profitably in the particular area in which he is situated. While keeping before him the market prices of the different varieties he has to consider whether he can produce a high price and delicate variety, or must he grow a lower price and hardy variety. In this connection he must consider the rain and drought, the insect and other pests, and the keeping quality of these varieties in transit. Then there are the early and late varieties to be considered, and the most important of all, the yield of muids per acre.

The solution of the question dealt with now, viz., " The classes of maize best suited for the European Market ", has been satisfactorily solved by other exporting countries only by careful observation and experience. The South African maize grower is gaining experience fast. He has been ably assisted and guided by the special sections of the Agricultural Departments of the different South African Governments, now under Union, dealing with this matter. Rapid progress has been made, and if things are continued on these lines we will all soon know which classes of maize can be best produced in South Africa, and which will meet with the greatest demand on the European markets. It is, however, my duty to give some idea as to what the European markets are now buying and what classes of maize they are paying the best price for. Up to this point I have not dealt with the named breeds but have only dealt with " classes ". Let me say at once that the buyers on the European markets do not worry themselves about breeds, they only deal with the " classes "; indeed, I do not think there are more than a very few dealers on the great grain markets of Europe who could give you the name of more than a few breeds of the maize they deal in.

For commercial purposes maize can be divided first into two main classes:—(1) "Flint or Round"; (2) "Dent or Flat". From these are made up the five great commercial classes of maize: "White Flat", "White Round", "Yellow Flat", "Yellow Round", and "Mixed".

Though "White Flat" has generally been making a better price than "Yellow Round" it is not used by any means in such large quantities in Europe as the latter class, and it has not yet been proved that it will hold its position as the highest price South African maize if very large quantities are shipped. While "White Round" is seldom wanted, "Yellow Round" is the class most generally dealt in; while "Yellow Flat" is also a very popular article it is of a little less value per quarter than the "Round". "Mixed" is, strictly speaking, "no class", and is always of less value than any of the before-mentioned classes.

The English markets are larger buyers of "Yellow", while the Continental markets favour the "White" classes. The variety of maize which always makes the best price is the "Small Yellow Flint", known as the "Cinquantino" or "Bessarabian", and is generally worth about 1s. 9d. per quarter (8d. to 9d. per muid) more than South African "White Flat" or "Yellow Round", but the yield per acre is said to be very small.

In dealing with the five commercial types of South African maize I will place them in the order in which they stand on the European markets, together with their approximate prices per quarter of 480 lb. (f.a.q.—Government terms, July-August shipments). I may mention that this order has been most generally maintained during the past four years—though sometimes there was little or no difference between the first two classes:—

	s.	d.
1. White Flat	22	3
2. Yellow Round	21	3
3. Yellow Flat	20	9
4. White Round	20	6
5. Mixed	20	0

This is on the basis that the maize under all these classes is of exactly similar quality; should, however, the "Yellow Round" be slightly better quality than the "White Flat" it will make a better price, the same remark applying to the other classes.

So far I presume we have been dealing with sound maize only, but as no maize-producing country in the world produces only sound or first quality maize, it is my duty to express an opinion as to what is to be done with maize which has become damaged or in an unsound condition. It must be remembered that maize out of condition still remains an article of commerce, and though I am just as anxious as any other person that the good name of South African maize on the European markets should be maintained and that only sound maize should be exported, I see no reason why damaged maize should not be exported provided such maize is sold as *damaged maize*, and not under a Government certificate placing it under a grade higher than that which it deserves. It has been found necessary in almost every trade or industry that markets should be found not only for the first and second qualities of the products, but also for the third grades, the damaged portions, and the by-products in such trades. And in

so far as the maize trade is concerned the same opportunity should be given to those producers and dealers who are unfortunately in possession of maize which has become damaged, perhaps through no fault of theirs, to enable them to export such maize if they choose to take the risk and they find they cannot dispose of it locally, but *stringent regulations* should be made that any maize to be exported, found to be in a "weevily", "musty", "damp", or other unsound conditions should be sold as such; and that both the Government Graders' certificate and the shippers' bill of lading be endorsed "weevilly", "musty", "damp", or otherwise; and further that such damaged maize be not shipped in the same holds or in near proximity to sound South African maize. If weevilly maize is exported and sold as "weevilly maize" and no Government certificate is given to the shipper placing it in any grade other than weevilly, it cannot damage the good name of South African maize on the oversea markets, and if it is not placed in the same hold or in the same ship it cannot damage sound South African maize. Most other countries ship damaged maize. they are well-known articles of commerce on the European markets, prices are made and uses are found for them. If growers cannot dispose of their damaged maize to those who choose to buy it, and who can find a use for it, they will not during unfavourable seasons make their industry pay.

Space does not permit me to deal with the uses to which different classes of maize are put in Europe, nor do I feel justified in dealing with the different-named breeds of maize; it will be sufficient for me to advise producers to aim at producing a good sound plump clean mealie containing lots of food irrespective of breed, always bearing in mind your local conditions and particularly the yield per acre, which is the most important of all, its capacity to withstand drought and resist disease, and experience will teach you which breed is the most profitable to produce.

Sterilizing Tobacco Seed-Beds.

REPORT ON STERILIZATION EXPERIMENTS CONDUCTED ON THE EXPERIMENT STATIONS OF THE TOBACCO AND COTTON DIVISION DURING THE SEASONS 1909-10 AND 1910-11.

By W. H. SCHERFFIUS, M.S., Chief of Tobacco and Cotton Division (Transvaal).

THE reason for sterilizing tobacco seed-beds, the usual methods applied, and the method producing the best results, are important questions and worthy of the careful attention of the tobacco planter.

Men who have made a special study of the subject are generally agreed as to why seed-beds need sterilizing. They are also aware of the methods usually applied; but when approaching the question as to which method gives the best results, we find there is a difference of opinion. It has been observed that promoters of new schemes for doing this work are very often too ready to arrive at the conclusion that theirs is the best method without first being in possession of sufficient data to substantiate their claim. The importance of this question and the lack of experimental evidence in the Transvaal from which to draw conclusions, led us to undertake a series of experiments on the Government Tobacco and Cotton Experiment Stations for the last two seasons. The experiments were conducted at three different stations and under three different men, but the results are practically identical.

Why should tobacco seed-beds be sterilized? Because it has been proven that a faster and healthier growth of seedlings is secured on properly sterilized soil. The reasons for this are due to the fact that after the soil has been heated it is dryer and can be worked into a better seed-bed, and because subjecting the soil to high temperatures helps to bring the plant food contained therein into a soluble condition so that it is readily available. Russell & Hutchinson, in an exhaustive series of experiments, have shown that when soil is heated to 98° C. and then moistened with water there is a rapid increase of ammonia in it, and also that the total amount of available nitrogen is increased by heating the soil to 98° C. If the soil is sterilized by burning wood, cotton stalks, or trash on it, plant food, such as potash salts, is left in the ashes of the burnt material. When these ashes are mixed with the soil all the plant food they contain, being in a water soluble form, is readily available for the young plants. Another good reason for sterilizing seed-beds is to kill the spores of parasitic fungi and to destroy weed and grass seeds usually lodged in the surface soil. If weeds and grass are allowed to grow in the seed-beds the young seedlings will certainly suffer.

Method of Sterilizing Seed-beds.

In our experiments we used five methods of sterilizing. Heat was used in different ways in four of these methods, and in the fifth formalin was used as the sterilizing agent. The methods were as follows: —

(1) *Open Fire Method.*—By this method the soil is sterilized by simply burning wood or other waste material on the top of it, thus providing sufficient heat to destroy weed seeds to a depth of 2 or 3 inches.

(2) *Boiling Water Process.*—When this process is used the seed-bed must first be properly prepared, then boiling water poured on it until the soil is wet 3 or 4 inches deep. In three or four days the operation must be repeated. After the second application of boiling water, do not sow the seed until the bed has dried out properly and the surface has been worked into condition.

(3) *Steaming Process.*—When this process is used the seed-bed is first prepared, and then a specially constructed steam-tight box of any convenient size is inverted over a portion of the bed. The steam is then conducted, by means of an iron pipe, into the box, and each portion of the bed steamed for fifteen minutes. The bed should then be allowed to dry properly before the seeds are sown.

(4) *Roasting Process.*—In this method the soil for the seed-bed is dug up and placed in a large receptacle, where it is heated until the soil attains a temperature of approximately 212° F.; the soil is then returned to the place from which it was removed. In America a machine is manufactured and sold, under the name of the " Wyatt Tobacco-Bed Burner ", which is a patent movable device especially designed for this sterilization work. The machine is constructed throughout of heavy sheet iron with adjustable wheel carriage, so that two men can move it. The soil pan over the furnace is 3 feet wide, 9 feet long, and 4 inches deep. The machine is placed at one end, in the middle of the strip of land to be used for seed-beds, and a fire of wood, brush, mealie stalks, or cotton stalks kept going under the front end of the furnace. A block of soil 3 feet wide, 9 feet long, and 3 inches deep, alongside the machine, is shovelled up and placed in the pan and baked for one hour. During the roasting process the soil is turned over two or three times with a long-handled shovel. When the soil is thoroughly roasted it is returned to its original place and another similar block from the other side is treated in a like manner. By this time the block of soil covered by the machine is also sterilized, and the machine can be pushed forward another 9 feet. Thus it will be seen that at each setting of the machine a space of 9 feet square is sterilized. Under ordinary circumstances two men can sterilize 40 to 50 square yards in one day. If a dry soil is being treated less time will be required for each operation, and consequently more ground can be covered in a day; while on the other hand, when dealing with a very wet soil a longer time will be required for each operation. In South Africa the principal advantage of the roasting method of sterilization would be the economical use of fuel.

(5) The fifth square was left untreated.

(6) *Formalin Treatment.*—When formalin is used as the sterilizing agent, the soil is first properly prepared and the seed-bed is then treated with formalin which has been properly diluted with

water. One-half of the solution is applied, then after three days the remaining half is added. After the second application three days are allowed to elapse, when the soil is again worked up and prepared for seeding.

COMPARATIVE RESULTS.

1. Open fire method.
2. Boiling water treatment.
3. Steaming process.
4. Roasting process.
5. Check or untreated plot.
6. Formalin treatment.

As will be shown by the following reports from the several stations the open fire method of sterilizing gave the best results. The roasting process came second, and was almost as good as the open fire method. The steaming process came third, but was not quite as good as the roasting process. The formalin treatment came fourth, and was almost as good as the steaming process. The boiling water gave the poorest results of all, and was but little better than the check or untreated plot.

The accompanying reports, with illustrations from the officers in charge of the stations where the experiments were carried out, give the details of these experiments as they were conducted.

RUSTENBURG.—H. W. Taylor, B.Agr., Officer in Charge.

Preparation of Soil.—The first season a strip of land adjacent to the general seed-beds was selected for the experiment. This land was used for seed-beds the previous season, and after the plants had been drawn the beds were dug up and planted to garden peas.

The second year the experiment was carried out on land which had not previously been under cultivation of any kind.

The space required was measured off and two wheelbarrow loads of well pulverized manure were spread on the soil; the whole was dug up to a depth of 8 inches and well worked together. The land was then divided into plots of equal size, each being four feet square.

Treatment.—The first square was treated by the open fire method, the space being covered with small logs and the latter covered with fine brushwood and straw. The logs were placed on small poles to keep them off the ground. The logs were allowed to burn for one hour, and then what remained of them, as well as the large pieces of charçoal, was removed from the bed. The ashes remained on the square and were dug under. The space was then enclosed with flooring-boards to keep out insects; flooring-boards were also placed crosswise on the plot to separate the several divisions. (See plate No. I.)

The second square was treated with boiling water at the rate of 6 gallons to the 4-feet square. In 1909-10 only one application of boiling water was given, but in the experiment of 1910-11 two applications were made, with an interval of three days between.

The third square was steamed by burying in the soil a tin "rose" attached to a rubber hose connected to a boiler. This process left the soil in splendid mechanical condition.

Sterilizing Tobacco Seed-Beds.

No. 1. Open fire. No. 2. Boiling water. No. 3. Steamed.

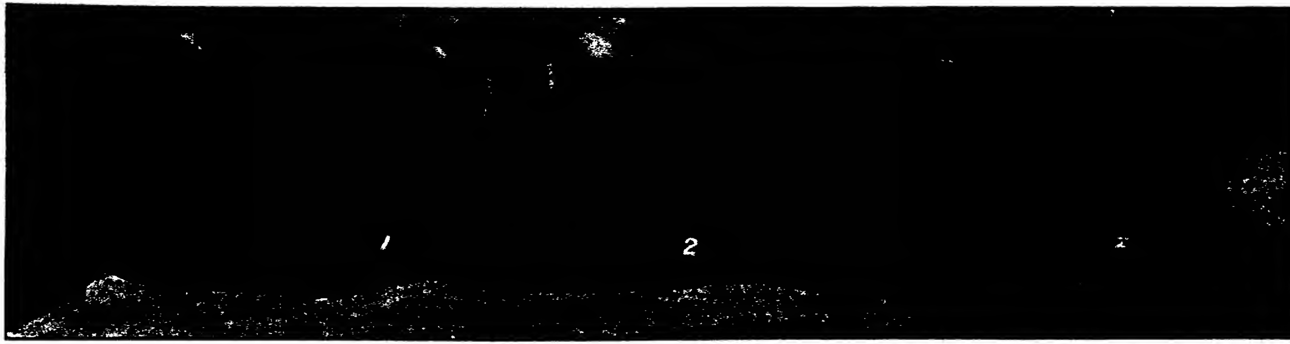
No. 4. Roasted. No. 5. Not treated.

Plate No. I.

Sterilization Experiments—Government Experiment Station, Rustenburg.

Photo by H. W. Taylor

Sterilizing Tobacco Seed-Beds.



No. 1. Open fire. No. 2. Boiling water. No. 3. Steamed.

No. 4. Roasted. No. 5. Not treated.

Plate No. II. Sterilization Experiments—Government Experiment Station, Rustenburg. *Photo by H. W. Taylor.*

The fourth square was roasted. The soil was removed to the depth of 6 inches and placed in a galvanized iron receptacle and thoroughly roasted until the soil registered the temperature of 212° F. It required constant mixing to thoroughly roast the soil.

The fifth square was left untreated.

The sixth square was treated with formalin. One pint of formalin was diluted with 16 gallons of water, and 8 gallons applied. After an interval of three days the remaining 8 gallons of the solution was applied, and another three days allowed to elapse before sowing the seed. The formalin was only used in the 1910-11 experiment.

NOTES ON SEEDING.—TABLE I.

Date.	Rate of Seeding.	Came up.
29th September, 1909 ...	1 c.c. of seed to 4 feet square ...	9th October, 1909.
31st August, 1910 ...	1 c.c. of seed to 4 feet square ...	14th September, 1910.

The first season no insects were found in the soil after treatment. In 1910-11 after squares 2 and 5 had been treated with boiling water and formalin, live wire-worms, which did not appear to be affected by the treatment, were found in the soil. The same was true after the second application of boiling water and formalin. No live insects were found in squares 1, 3, and 4 after they had been treated. Wire-worms were also noted in the untreated square.

Stand.—On the basis of ten as a perfect stand the following observations were made:—

TABLE II.

Date.	Square 1.	Square 2.	Square 3.	Square 4.	Square 5.	Square 6.
11th October, 1909...			9·0	9·5	8·5	--
19th October, 1909...			8·5	9·5	8·0	—
17th September, 1910			10·0	10·0	10·0	10·0
17th October, 1910...			9·0	9·0	9·5	9·5

The following table shows the number of weeds and grass sprigs, and also the colour and growth of the tobacco plants from time to time:—

TABLE III.

Square Number.	Date.	Number of Weeds.	Number of Grass Sprigs.	Colour.	Growth.
1	29th November, 1909 ...	2	2	Good.	Good.
2	" " ...	3	3	Fair.	Fair.
3	" " ...	8	2	"	"
4	" " ...	3	3	Good.	Good.
5	" " ...	9	8	Poor.	Poor.
1	24th January, 1910 ...	3	4	Good.	Good.
2	" " ...	7	5	Poor.	Fair.
3	" " ...	4	8	"	Poor.
4	" " ...	4	3	Good.	Good.
5	" " ...	9	10	Poor.	Poor.

Square Number.	Date.	Number of Weeds.	Number of Grass Sprigs.	Colour.	Growth.
1	24th September, 1910 ...	0	0	Good.	Good.
2	" " ...	0	17	Fair.	Fair.
3	" " ...	2	0	Good.	Good.
4	" " ...	0	0	"	"
5	" " ...	4	0	"	"
6	" " ...	0	2	"	"
1	1st October, 1910 ...	0	0	Excellent.	Good.
2	" " ...	0	18	Fair.	Fair.
3	" " ...	2	1	"	"
4	" " ...	0	0	Good.	Good.
5	" " ...	4	0	Fair.	"
6	" " ...	0	2	"	"
1	17th October, 1910 ...	1	0	Good.	Good.
2	" " ...	1	24	Fair.	Fair.
3	" " ...	2	3	"	"
4	" " ...	0	0	Good.	Good.
5	" " ...	3	5	Fair.	Fair.
6	" " ...	0	2	"	"
1	24th October, 1910 ...	1	0	Good.	Good.
2	" " ...	2	40	Poor.	Poor.
3	" " ...	2	3	Fair.	Fair.
4	" " ...	0	2	Good.	Good.
5	" " ...	5	8	Poor.	Fair.
6	" " ...	2	2	Fair.	"
1	3rd November, 1910 ...	1	1	Good.	Good.
2	" " ...	3	45	Poor.	Poor.
3	" " ...	2	3	Fair.	"
4	" " ...	1	3	Good.	Good.
5	" " ...	3	10	Poor.	Fair.
6	" " ...	2	5	Fair.	"

Early in November we observed that some of the plants were "damping off" in all of the squares, No. 2 being least affected, No. 1 next, No. 3 bady affected, No. 4 next, Nos. 5 and 6 about the same and not so bad as No. 4. Later on this trouble ceased.

15th November. Square No. 2 was decidedly grassy. Growth of plants in No. 1 best, with No. 4 second best; No. 2 shows poorest growth, with No. 6 second.

From the above table it will be seen that as regards freeness from weeds and grass and as regards colour and growth, the square treated by the open fire method ranked first both seasons, and the square treated by roasting ranked second.

The following table shows the number of plants in each square large enough to transplant at given dates:—

TABLE IV.

Date.	1.	2.	3.	4.	5.	6.
21st December, 1909	189	89	113	168	85	—
6th January, 1910	200	170	180	190	200	—
17th January, 1910	207	212	165	140	148	—
24th January, 1910	61	69	80	91	71	—
TOTAL	657	540	538	589	504	—
1910-11.						
12th December, 1910	218	55	137	178	98	74
28th December, 1910	126	62	44	90	87	264
TOTAL	344	117	181	278	185	338

During both seasons the largest number of plants suitable for transplanting was taken from the square treated by the open fire method.

In 1909-10 the square treated by roasting gave the second largest number of plants, but in 1910-11 it ranked third. The square treated with formalin in 1910-11 gave the second largest number of plants, but they were slightly later than those in squares 1 and 4. Boiling water and steaming gave little, if any, better results than no treatment at all.

The total number of plants taken from the several squares does not show accurately the effect of the various methods of sterilizing.

In order to have a definite idea of the real result of the different methods of treatment, the plants must be seen in the seed-bed.

The experiment was shown to numerous visitors both seasons, and all without hesitation picked out the plants in square No. 1 as being the best.

The experiment has established definitely that for this district the open fire method of sterilizing seed-beds produces the best results.

TZANEEN.—O. B. Chisholm, Officer in Charge.

The sterilization experiments of 1909-10 were repeated in 1910-11, with the addition of one plot with formalin.

Each bed or plot was laid out 4 feet square and sown at the same time with 1 cubic centimetre of seed to each plot.

The soil used for both seasons was a reddish brown loam lightly intermixed with fine sand, and at a depth of 6 inches underlain with a heavy subsoil of a dark red colour.

Plot No. 1. Open Fire Method.—The soil was thoroughly burned for one hour and a half, and then all charcoal and remaining wood was removed, leaving the ashes, which were thoroughly mixed with the soil to a depth of 2 inches.

Plot No. 2. Boiling Water Treatment.—The soil was treated with boiling water and at the same time stirred to a depth of 2 inches. Two applications were made, three days apart, using 8 gallons at each application.

Plot No. 3. Steaming Process.—The soil, to a depth of 2 inches, was taken up in a small pan and placed in a large steaming box, which was made air-tight and connected to a steam boiler and steamed at a pressure of 60 lb. for fifteen minutes. The soil was then returned to the bed.

Plot No. 4. Roasting Process.—The soil, to a depth of 2 inches, was taken up and roasted for twenty minutes on corrugated iron over a furnace, and then returned to the bed.

Plot No. 5. Check or not sterilized.

Plot No. 6. Formalin Treatment.—The soil was worked to a depth of 6 inches and treated with 1 pint of formalin diluted with 16 gallons of water. Two applications were made, 8 gallons being applied the first day, and then after an interval of three days the remaining 8 gallons were applied. After waiting another three days the seed was sown.

The plots were closely examined and notes made every week, and from these the following results were compiled:—

TABLE I.—1909-10.

No. of Plot.	Germination.	Colour.	Growth.	Character of Stem.	Uniformity.
1	Good.	Good.	Excellent.	Short and strong.	Not very good.
2	Medium.	Poor.	Medium.	Slender.	"
3	Good.	Good.	"	"	"
4	"	Fair.	"	"	Bad.
5	Excellent.	Very poor.	Very poor.	Very slender.	Very good.
1	Very good.	Good.	Vigorous.	Short and strong.	Excellent.
2	Medium.	Poor.	Medium.	Slender.	Good.
3	"	Good.	Vigorous.	Short.	Bad.
4	"	"	Good.	Short and strong.	"
5	"	Poor.	Poor.	Slender.	Good.
6	Good.	"	"	Weak and brittle.	Very bad.

Plate III shows the comparative growths.

Remarks.—Plot No. 1, both seasons, was decidedly the best of the lot in every respect, the plants being strong and well developed. Plot No. 4 was second best, though the germination and uniformity was very bad in comparison with No. 1. Plot No. 3 ranked third in germination, but in uniformity it was about the same as plot 4, but the plants were not so strong and well developed.

Plots Nos. 2, 5, and 6 were very inferior, probably due to a certain extent to the large amount of weeds and grass in them. The plants in these beds were too weak for any use and were not transplanted as were the plants in the other three plots.

INSECTS.—TABLE II.

Plot Number.	Nematode Attacked.		Dikkop Attacked.	
	1909–10.	1910–11.	1909–10.	1910–11.
1	Slightly.	Slightly.	Severely.	Slightly.
2	50 per cent.	Severely.	Slightly.	"
3	Slightly.	Slightly.	"	"
4	"	Very slightly.	Severely.	Very slightly.
5	—	Slightly.	—	Slightly.
6	Slightly.	Severely.	Slightly.	"

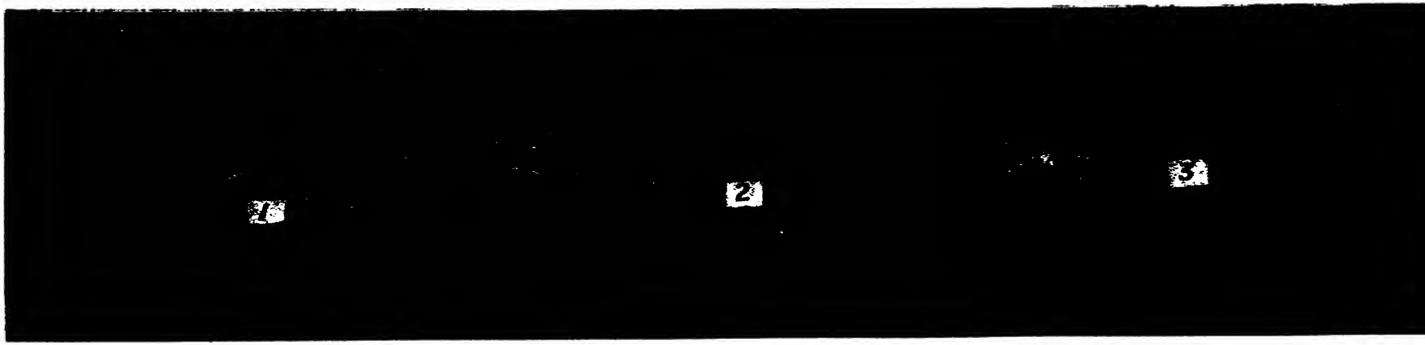
BARBERTON.—V. C. Brewer, Officer in Charge.

The several plots were arranged as follows:—

No. 1. Steaming process.
No. 2. Open fire method.
No. 3. Roasting process.
No. 4. Boiling water process.
No. 5. Check plot, not treated.
No. 6. Formalin treatment.

Method of Treating.—The ground was dug to a depth of 5 inches and then plot No. 1 was treated by burying perforated steam pipes about 2 inches below the surface; then a tarpaulin of four thicknesses was laid on top to prevent the steam from escaping from the soil.

Sterilizing Tobacco Seed-Beds.



No. 1. Open fire. No. 2. Boiling water. No. 3. Steamed.

No. 4. Roasted. No. 5. Not treated.

Plate No. III.

Sterilization Experiments—Government Experiment Station, Tzaneen.

Photo by O. B. Chisholm.

A pressure of 40 lb. was maintained in the boiler, and the steam was allowed to escape through the pipes for fifteen minutes. To ascertain when the soil had been sufficiently treated a potato was placed in the soil, and when it was thoroughly cooked the steam was turned off.

Plot No. 2 was treated by piling wood on the surface and then burning it. A similar test to the one used above was again applied.

Plot No. 3 was treated by removing the soil to the depth of 3 or 4 inches and placing it on corrugated iron sheets fixed over the fire. The same test applied on plot No. 3 as on plots Nos. 1 and 2 to determine when the soil had been sufficiently roasted.

Plot No. 4 was treated with water which had been heated to the boiling point in paraffin tins, and then poured over the plot.

Plot No. 5 was not treated.

Plot No. 6 was treated with a pint of formalin diluted with 16 gallons of water. The plot was first treated with 8 gallons of the solution, and after three days the remaining 8 gallons were applied.

All plots were sown the same day. The rate of seeding was 1 cubic centimetre of seed to each 4 feet square.

NOTES.—TABLE I.

Number of Plot.	Date Sown.	Came Up.	Germination.
1	20th October, 1909 ...	28th October, 1909 ...	Good.
2	" " ...	" " ...	Perfect.
3	" " ...	" " ...	Good.
4	" " ...	" " ...	"
5	" " ...	" " ...	"
1	25th October, 1910 ...	5th November, 1910 ...	Almost perfect.
2	" " ...	7th November, 1910 ...	Perfect.
3	" " ...	5th November, 1910 ...	Very good.
4	" " ...	" " ...	Poor.
5	" " ...	7th November, 1910 ...	"
6	" " ...	" " ...	Fair.

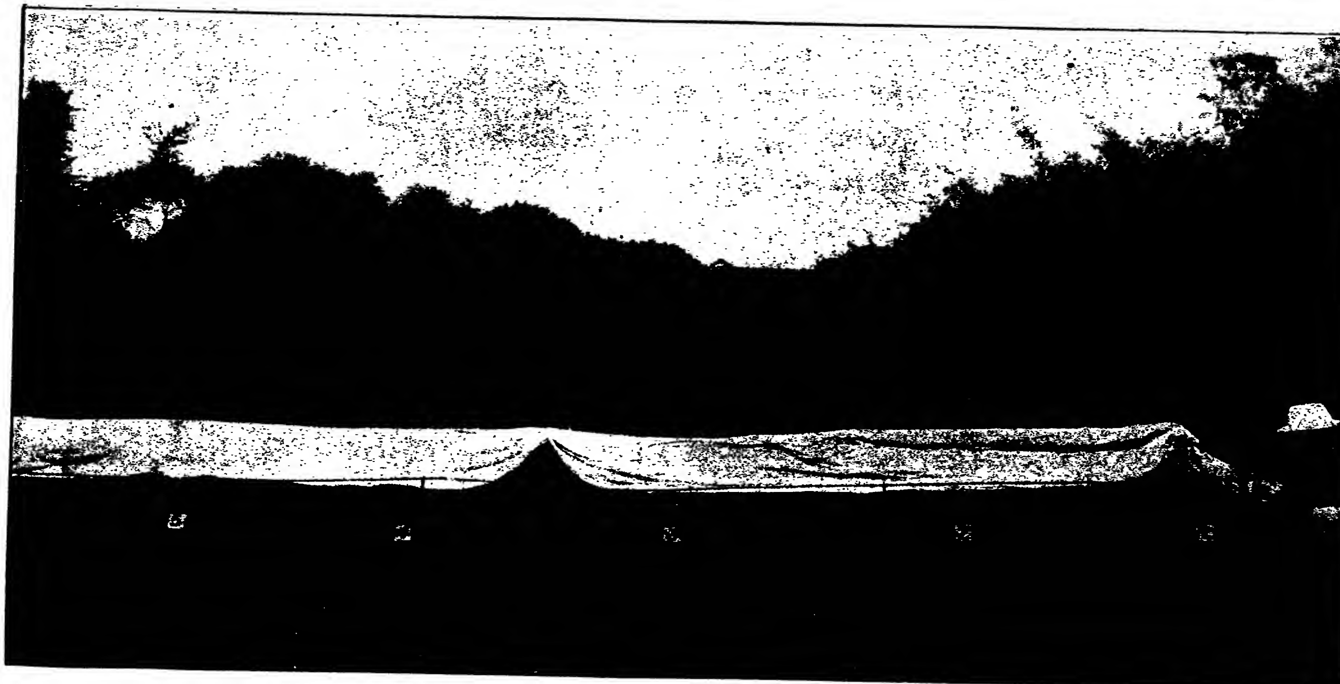
TABLE II.—1909-10.

Number of Plot.	Date.	Condition of Plants.	Weeds and Grass.
1	12th November, 1909	Healthy and uniform ...	Few weeds in plot.
2	" "	Very healthy	No weeds.
3	" "	Exceedingly healthy ...	Few weeds.
4	" "	Somewhat yellow ...	More weeds than tobacco plants.
5	" "	Very yellow	Weeds choking out tobacco plants.
1	27th November, 1909	Healthy and vigorous ...	Few weeds.
2	" "	Very healthy and vigorous	No weeds.
3	" "	Healthy and vigorous ...	Few weeds.
4	" "	Small and yellow ...	Weeds have outgrown plants.
5	" "	Very yellow	Overgrown with weeds.

After all weeds had been removed plot No. 4 had about half as many plants as Nos. 1, 2, and 3, while plot 5 (untreated) had only about one-quarter as many as Nos. 1, 2, and 3 (see plate No. IV).

On the 20th December, 1909, we planted ten plants from each plot in another plot 20 feet square, which contained nematode in the soil, in order to determine comparative results of each treatment.

Sterilizing Tobacco Seed-Beds.



No. 5. Not treated. No. 4. Boiling water. No. 3. Roasted. No. 2. Open fire. No. 1. Steamed.

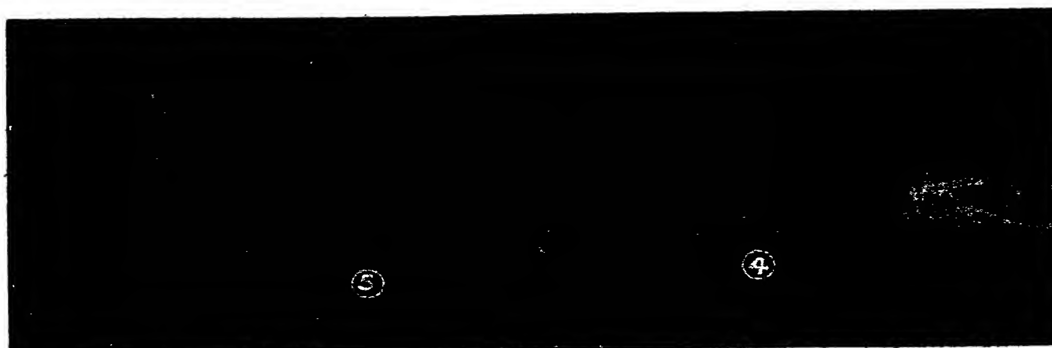
Plate No. IV.

Sterilization Experiments—Government Experiment Station, Barberton.

Photo by V. C. Brewer.

Sterilizing Tobacco Seed-Beds.

No. 3. Roasted. No. 2. Open fire. No. 1. Steamed.



No. 5. Not treated. No. 4. Boiling water.

Plate No. V.

Sterilization Experiments—Government Experiment Station, Barberton.

Photo by V. C. Brewer

The plants from plots Nos. 1, 2, and 3 were absolutely free from nematode or any other disease at time of transplanting. Plants from Nos. 4 and 5 showed indications of nematode on their roots at time of transplanting. When the plants were subsequently examined after they had been growing in the nematode-infested plot all were found to be more or less affected with it.

On the 21st January, 1910, all plants were removed from plots.

Plot No. 1.—Very few nematode on the roots of the plant.

Plot No. 2.—No nematode noticeable.

Plot No. 3.—Few of the roots show nematode.

Plot No. 4.—Most of the plants affected with nematode.

Plot No. 5.—All plants badly affected with nematode.

TABLE III.—1910-11.

Plot Number.	Date.	Condition of Plants.	Weeds and Grass.
1	14th November, 1910	Healthy	No weeds.
2	„ „	Exceedingly healthy ...	„
3	„ „	Healthy	„
4	„ „	„	Few weeds.
5	„ „	„	Plentiful.
6	„ „	„	Few weeds.
1	21st November, 1910	Healthy	Few weeds.
2	„ „	Exceedingly healthy ...	No weeds.
3	„ „	Healthy	Few weeds.
4	„ „	Small	As many weeds as plants.
5	„ „	Nematode noted; plants yellow	Weeds have overgrown plants.
6	„ „	Healthy	More weeds than in plots 1 and 3.

On 8th December the plants in all plots were examined with reference to nematode. The only plots showing any sign of nematode were Nos. 4 and 5. The plants from the latter plot all appeared to be affected, while those from plot 4 were not nearly so bad.

Throughout the experiment, the plants in plot No. 2 were far in advance of those in the other plots, being ready to transplant a week or ten days before the others. Plot No. 3 was second in earliness; the other plots were about the same in this respect.

On 20th December twenty-five plants from each plot were transplanted in the field; nematode noted on the roots of plants from plots Nos. 1, 4, and 5. Plants from the other plots were apparently healthy.

On 16th January, 1911, plants from plot No. 2 far in advance of the plants from the other plots, although nematode was noted on the roots of plants from all plots after they were transplanted into the field.

The seed-beds from which the main crop was planted were sterilized by the open fire method, using old cotton stalks for fuel. There was no occasion to weed these beds, in fact no weeds appeared in them throughout the season.

The experiments in sterilizing tobacco seed-beds have already demonstrated that burning the beds with an open fire is by far the best way of killing weed seeds and germs in them; and at the same time, where wood, brush, cotton stalks or mealie stalks are available, it is the cheapest method.

Shearing Twice *versus* Shearing Once.

By C. M. MALLINSON, Flockmaster and Wool Expert (Transvaal).

TWICE shearing in one year is a most undesirable and detestable practice. It is a subject in South Africa calling for serious attention, more so because it is very common among a certain class of farmer. Many reasons are, of course, given by those following this practice when the matter is brought to argument. The one will tell you that he shears twice on account of the grass seeds and burs, another that his flock was infected with scab and that it was the only course to adopt to get his sheep clean; again, somebody else will argue that he gets a better return per sheep when they are shorn twice, or that he required money badly to meet his creditors. Another will contend that it keeps his flock in better condition, and so on.

These and other statements when carefully studied, will soon convince the man who knows his business that they are not as sound and as genuine as they appear at first sight. Leaving out of the question the effect which shearing twice has upon the condition and constitution of the flock, a subject which leaves large scope for debate, it is obvious that there are many grounds, monetary as well as others, upon which the matter could be argued out and settled in favour of the disposal of that custom altogether.

Anybody acquainted with the wool trade knows that short and faulty wools have always to take a second place on the market as compared with a good twelve months' clip. It is always the first to decline in value when the market is uncertain, consequently the man who produces short faulty wools will only realize a price in harmony with low-grade wools, that is to say, no wool buyer is going to give a first class price for a second class article. In other words deep, well-grown, shafty wools are always sought after by the manufacturers, who generally realize their full value on account of the big demand for that particular kind of raw material all over the civilized world.

The half-grown staple is principally used for flannels. This being the case they cannot compete with the superior or full-grown clips, but if anything are always to be found among the inferior and lower classes.

What is more, these short-stapled, twice shorn wools are to a great extent competing with the noil from the tops or combed wools. Noil can be, and is, used for a great many purposes for which your six-months' wool is utilized. Certainly your six-months' wool has a little more shaft, but that does not alter the fact that it has to compete with the noil. There are always sufficient short and inferior wools of twelve months' growth, without cutting the staple in two as in the case of shearing twice.

Wools of 3 to 3½ inch staple are always worth at least 1d. more per lb. than wool of but half that length, though they be in every

respect of the same description. This is proved at every sale. The market is always better for the faultless sorts.

I wish to demonstrate in the following lines the fallacy of most of the arguments as to the more profitable return of shearing twice as against only shearing the sheep once when the wool is of a twelve months' growth. These figures, which are based on a very careful study of the subject and on practical experience, will, I am quite sure, convince even the most conservative farmer of the profits to be derived from shearing once as compared with shearing twice.

Take for argument's sake a flock numbering 1000 sheep for comparing returns:—

Shearing Twice.

By 1000 sheep cutting 4 lb. of wool at 7d. per lb.				£116	13	4
Ditto, for second shearing				116	13	4
				£233	6	8
Less—						
To cost of shearing 1000 sheep at 1d. per head	£4	3	4			
Ditto, for second shearing	4	3	4			
				8	6	8
Gross income for one year				£225	0	0

Shearing Once.

By 1000 sheep cutting 8 lb. of wool per sheep at 7d. per lb.	£233	6	8
By 1d. per lb. added for extra length	33	6	8
	£266	13	4
Less cost of shearing 1000 sheep at 1d. per sheep	4	3	4
	£262	10	0

Comparing the results with one another we come to the following conclusion that by shearing once you profit to the extent of £37. 10s. on the wool of 1000 sheep, or 3¾ per cent. on its monetary value, over the abominable custom in vogue on many farms. Besides giving you this monetary profit you earn a good name for your commodity on the market, which is a good asset in itself.

The following quotation from the *Yorkshire Post*, dated 25th August, 1911, from an article by a special correspondent, might be very interesting in this connection:—

"Stocks of long combing grease are very light at the shipping ports [of South Africa.—*Writer*], but some fairly big quantities of wool exist of short six-months' staple. It does seem a pity that South African pastoralists still stick to the old-time method of shearing twice a year. Cape tops all through this year have been selling freely, but Bradford buyers want something longer than six-months' wool, and although one notices with pleasure an advance in the methods of sheep farming, still there is a considerable distance to travel before Australian methods are adopted in their entirety."

You will observe that I have not gone into details of the additional expenses in connection with shearing, such as feeding shearers and other work which must necessarily stand still, your own time occupied, etc., which if reckoned in £.s.d. will still show a much more substantial profit in favour of shearing once. From the preceding statements it ought now to be clear to every farmer that shearing once means more money, and even if the farmer is compelled to pay interest on an overdraft for a few months he will be better off by allowing his wool to grow its full length. It means high prices, and I may say better wool with less expense. As far as the condition of the flock is concerned, I maintain that it is better for the sheep to be shorn once a year; especially so out on the very much exposed veld in the Transvaal. The shearing twice must necessarily be done just before and after the winter. You are shearing your sheep at a time when we are apt to get a few very cold days, which must necessarily affect the condition of your sheep.

Of course it is an exception when you shear a few housed animals for a certain purpose which are rugged and well looked after until their wool is sufficiently grown for protection. Much damage is done to shorn sheep by the cold weather, and, even not taking into consideration the loss of condition, you are running a big risk of losing a number of your sheep by commencing to shear too early in the spring.

I would like to mention here that by planting trees and plenty of them you are making nice shelter for your sheep to camp in during unseasonable weather, which is most conducive to the health and well-being of your sheep, and also your next year's clip.

If the sheep are shorn at the right time there will be no more occasion to complain about the trouble of grass seeds, burs, etc., than there will be in the case of shearing twice. In fact the time could be so chosen that it will be more advantageous for the sheep if only shorn once. The right time depends upon the season and the time when the seeds get ripe and begin to cause the trouble. If farmers would carefully take into consideration the state of the grass seeds before shearing, and act accordingly, they would greatly minimize the trouble.

Maize Experiments at the Experimental Farm, Potchefstroom.

By Tom O. Bell, B.A. (Cantab.), Lecturer in Botany.

This is a progress report of the experiments referred to in the April, 1910, number of the *Transvaal Agricultural Journal*, and Bulletin No. 107 of the Transvaal Agricultural Department.

In the mealie season 1909-10 the crops suffered from drought in the early stages, were flooded out in December, recovered somewhat, and produced a fair crop.

In the last mealie season here (1910-11), owing to heavy early rains, the young plants made rapid growth and got an excellent start. Then came the drought, which reached and continued at its worst at the time when the majority of the breeds were at the most critical stage of growth, i.e. during the flowering period. Owing to this in many cases imperfect pollination took place, which resulted in an abnormal proportion of small, badly-filled ears. Rain fell after this, but right up to the end of the season the fall was considerably below the average and quite insufficient to secure the best results.

Tables showing the rainfalls for both seasons follow:—

Rainfall.

	Total Rainfall in Inches.		On Days.	
	1909.	1910.	1909.	1910.
July	0·36	—	2	—
August	0·31	—	2	—
September	0·02	0·88	1	1
October	0·39	6·00	4	13
November	2·81	1·62	10	7
December	10·26	4·13	14	13
	1910.	1911.	1910.	1911.
January	3·45	1·46	12	10
February	1·77	3·13	11	10
March	2·49	1·91	5	11
April	0·14	2·53	3	9
May	0·15	2·68	3	9
June	0·06	0·01	2	1
	22·21	24·35	69	84

In 1909-10 the trials were conducted on land consisting of a brown loam in a very good state of fertility.

The actual piece of land devoted to the experiment was of course selected for its uniformity, and to ensure the results being as comparative as possible two rows of each breed of maize were planted across the full length of the field, breeds of similar robustness and general character of growth being placed next to each other.

In previous years the trials had been conducted on check-row principles, the seed being sown in hills 3 feet apart in each direction;

but in this year that system was discarded and the seed planted in continuous rows 3 feet apart.

This was done by hand, it having been found in previous experiments that a mealie planter—even when adjusted with the greatest care—did not deposit the seeds sufficiently accurately for experimental work.

The field was watched throughout the season, and any blanks in the plant due to borer, faulty germination, or other such accidental cause, carefully noted. Such blanks of course affect the yield, and as they are the result of accident, and not a characteristic of particular breeds, allowance must be made for them in comparative experiments. These allowances, and the fact that the most even stand in a field—even if not the best part—is certainly not the worst, together make the calculated yield per acre come out at a higher figure than is actually obtained over large areas. This, however, though giving a somewhat inflated appearance to the yield generally, does not affect the relative positions of the different breeds.

In harvesting, two stretches, each 22 yards in length, were selected out of the full length of the rows at places where the stand seemed to be the most even for all breeds. The ears from both rows of each breed were harvested from these two selected areas, shelled, the grain weighed, and the result calculated out to weight per acre, after the necessary additions for blanks were made. This makes a total of four chains length harvested of each breed.

It will be noticed in the tables below that the difference in the yield per acre of the best breed and of the worst of those tried in the last two seasons is not so large as might be expected. This is explained by the fact that as the result of similar trials in previous years many breeds which have been found bad yielders have been discarded from year to year. Those now left in are, therefore, only the best of a very large number tried. This selection has eliminated the low yielders and thus reduced the differences between the top and bottom yields.

In 1910-11 the trials were conducted on the same principles as in the previous season. The piece of land selected was a reddish-brown loam, also in a good state of fertility. No manure was applied to the mealies, but they followed on a crop of roots which had been manured with dung and superphosphate.

BREED TRIALS, 1909-10.

Breeds (in order of yield).	Weight of Grain per Bushel.	Yield per Acre.
	Lb.	Bags.
1. Eureka	59½	15·95
2. Natal White Horsetooth	54	13·5
3. { Hickory Horsetooth	58	12·7
{ Chester County Mammoth	57	12·65
5. Yellow Cango	63	12·1
6. Iowa Silver Mine	58	11·82
7. Potchefstroom Pearl	57	11·55
8. { Champion Yellow Dent	51½	11·00
{ Hickory King	60½	11·00
10. Champion White Pearl	58	10·45
11. Yellow Hogan	59	9·62
12. { New England	61½	8·8
{ White Botman	60½	8·8

BREED TRIALS, 1910-11.

Breeds (in order of yield).	Height.		Weight of Grain per Bushel.	Yield per Acre.	Remarks.
	Ft.	in.	Lb.	Bags.	
1. { Potchefstroom Pearl ...	7	6	64	28·9	Second year of trial.
1. { Chester County Mammoth	6	6	65	28·7	
3. White Flint	7	0	65	28·2	First year of trial. Seed from Lichtenburg District.
4. { Eureka	7	0	64	27·1	
4. { Champion White Dent ...	7	0	57½	27·1	
4. { Reid's Yellow Dent ...	6	6	62½	26·9	First year of trial.
7. Yellow Hogan	7	0	64	26·5	
8. Natal White Horsetooth ...	9	0	59½	25·3	
9. { Champion White Pearl ...	6	6	63½	25·0	
9. { Iowa Silver Mine ...	6	6	63	25·0	
11. New England	6	0	66½	24·2	
12. Yellow Cango	6	0	67	23·5	
13. Hickory King	6	6	63	22·9	Does badly in a droughty season and well in a rainy one.
14. White Cango	5	6	65½	22·5	
15. Hickory Horsetooth ...	6	0	62	21·5	
16. White Botman	5	6	65	17·5	Its usual position.

Potchefstroom Pearl—a variety derived from Champion White Pearl, which was very variable when first grown here and appeared to contain several types, one of which has been fixed and named as above—shares the first place with Chester County Mammoth. In the field crop this was confirmed, Potchefstroom Pearl proving itself to be the best crop harvested. It is a medium to medium early breed, having a broad, flat grain thicker than Hickory King, and one which will yield a higher proportion of sifted meal than most other white breeds.

Reid's Yellow Dent—now tried for the first time here—is very early in coming to maturity and appears to be a heavy yielder. It has a deep grain of good colour and quality, and seems a very promising early breed.

The seed of the *White Flint* was obtained from the Lichtenburg District. It would appear to be a heavy yielder, but must be tried for another year or two before anything definite can be said about it.

BREED TRIALS FOR FIVE YEARS.

Breed (in order of yield).	Character.	Maturation.	Weight of Grain per Bushel. Average of Five Years.	Yield per Acre in Lb.					Average of Five Years.	
				1906–07.	1907–08.	1908–09.	1909–10.	1910–11.	Lb.	Bags.
1. Eureka	Yellow Dent ...	Medium early...	62	5574	4180	5720	3190	5410	4815	24·1
2. Chester County Mammoth	„ „ ...	Early ...	62½	6722	3300	4840	2530	5742	4627	23·1
3. Natal White Horsetooth ...	White Dent ...	Very late ...	60	7042	3080	4180	2695	5060	4412	22·1
4. Hickory King	„ „ ...	Medium late ...	62	6616	3190	5280	2200	4580	4373	21·9
5. Yellow Hogan	Yellow Dent ...	Late... ...	63	5922	3640	4400	1925	5300	4256	21·3
6. Hickory Horsetooth ...	White Dent ...	„	62	6108	3410	4290	2547	4290	4130	20·65
7. {Iowa Silver Mine ...	„ „ ...	Medium ...	63	5308	3630	4080	2365	4985	4073	20·4
7. {White Cango	White Flint ...	Medium early...	66	6402	3300	4400	1705	4510	4063	20·3
9. {Yellow Cango	Yellow Flint ...	Medium ...	66	5361	4070	3520	2420	4700	4015	20·1
9. {Champion White Pearl ...	White Dent ...	Medium early...	61½	6189	3410	3300	2090	5000	4000	20·0
1. New England	Yellow Flint ...	Medium late ...	66½	6161	2592	3740	1760	4840	3818	19·1
2. White Botman	White Flint ...	Early ...	64	5549	2420	3190	1760	3500	3283	16·4

Of these, *Eureka* has held a consistently high position all through the trials. It possesses a grain of excellent colour and quality, and is in every way suitable for export.

Chester County Mammoth has also done well, especially during the last two or three years. It is a very early breed, with a small grain, but otherwise of sufficiently good quality for export.

Hickory King does best in a wet season, when it produces very heavy yields of high quality grain, but it does badly in a droughty season. This feature has also been confirmed in the field crops.

Natal White Horsetooth requires a district with a long period of growth, as it is very late. It produces the heaviest yield for silage purposes.

Iowa Silver Mine is a standard white breed, medium in maturity, but it is apt to become rather small and shallow in grain. It is suitable for districts where rainfall is late.

Since the previous summary of the trials was prepared the following varieties have been discarded:—Austen's Colossal, Virginian Horsetooth, Star Leaming, Golden King, 100-Day Bristol, Early Butler, Indian Pearl, Improved Early Horsetooth, Wisconsin White Dent, Thorough-bred White Flint, King of the Earlies, Drought-proof Yellow Dent, Brazilian Flour Corn, Wood's Northern White Dent, Extra Early Huron Dent, and Yellow Hogan.

As a result of continued trials it is proposed to reduce the number still further in the field areas grown for seed purposes to the following breeds:—

Eureka, Potchefstroom Pearl, Hickory King, Chester County Mammoth, Iowa Silver Mine, Natal White Horsetooth, and Yellow Cango.

The last does not occupy a high position in the trials here, but in cold districts it is regarded as a particularly hardy variety.

The following new varieties, received through the Division of Botany, are promising:—

Johnston County White, Snow White Dent, Southern White Gourd, Palin's Corn Flake, Snow Flake, Funk's Yellow Dent.

The following varieties, received from the same source, have been discarded after one year's trial:—

Will's Dakota, Minnesota King, Pride of the North, Southern Prolific, Will's Gehu, Old Cabin Home, Moule's Golden Beauty, Improved Mastoden, Leaming Field Corn, Pennsylvania Early Dent, Meekham's Golden Beauty, Drought Proof.

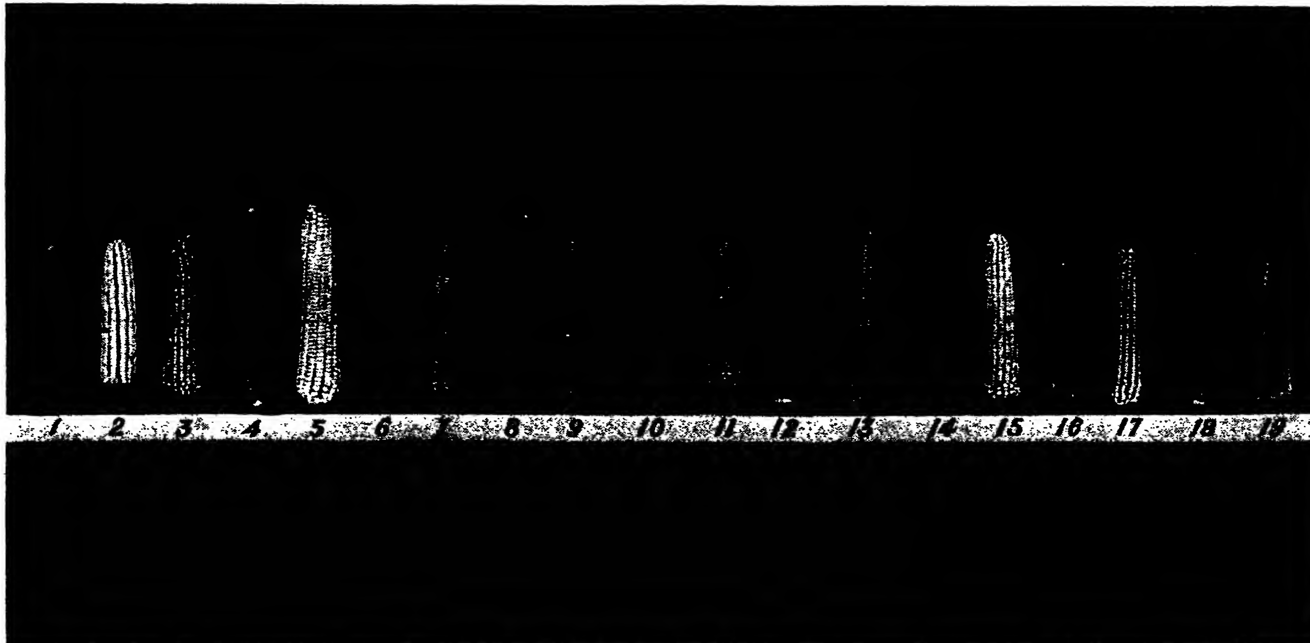
DISTANCE OF PLANTING EXPERIMENT.

Distances of Rows apart.	Breeds.		Average of Six Years, 1904–5 to 1910–11 (1905–6 missing).
	1909–10. Yellow Hogan.	1910–11. Iowa Silver Mine.	
	Bags.	Bags.	
2 feet	12·4	26·5	20·63
2 feet 6 inches	10·6	22·2	18·33
3 feet	6·6	23·7	18·5
3 feet 6 inches	9·4	25·75	18·45
4 feet	7·8	20·7	16·9

In this experiment over a number of years, the crop planted in rows 2 feet apart shows the largest yield, but the grain from same is small and poor in quality. The next three planted in rows 2 feet 6 inches, 3 feet, and 3 feet 6 inches respectively give practically the same results on a six-years' average; and the grain is of good size and quality in each case, though with the 2 feet 6 inches in rows it may tend to be slightly smaller than in the case of those rows wider apart.

A few photographs of pure-bred ears, etc., are appended to this article.

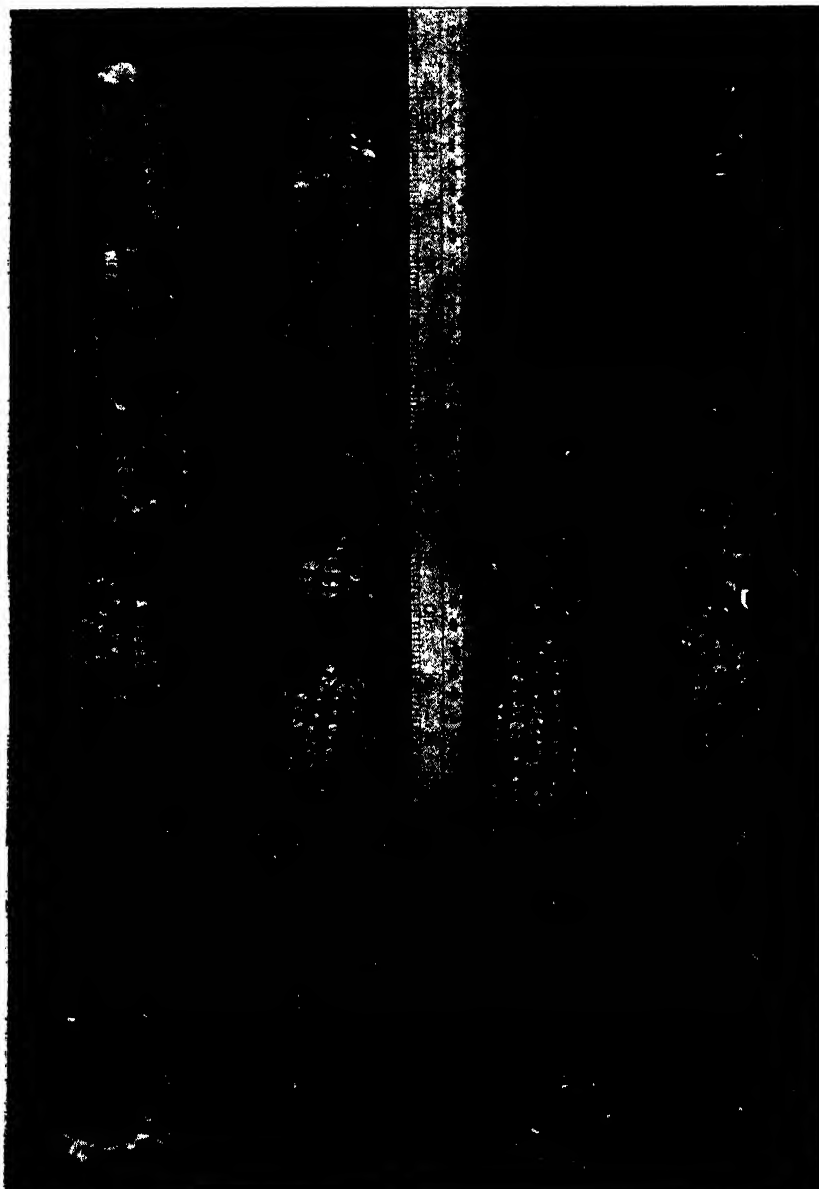
Maize Experiments at the Experimental Farm, Potchefstroom.



SPECIMEN EARS: PURE BRED AND TRUE TO TYPE.

1 Australian 90-Day.
2 Hickory Horsetooth.
3 100-Day Bristol.
4 New England 8-Row.
5 Natal White Horsetooth.
6 Golden King.
7 Hickory King.
8 Austen's Colossal.
9 Iowa Silver Mine.
10 Chester County Mammoth.
11 Virginian Horsetooth,
12 Eureka,
13 White Cango.
14 Yellow Hogan.
15 Potchefstroom Pearl.
16 Indian Pearl.
17 White Botman.
18 Yellow Cango.
19 Champion White Pearl.

Maize Experiments at the Experimental Farm, Potchefstroom

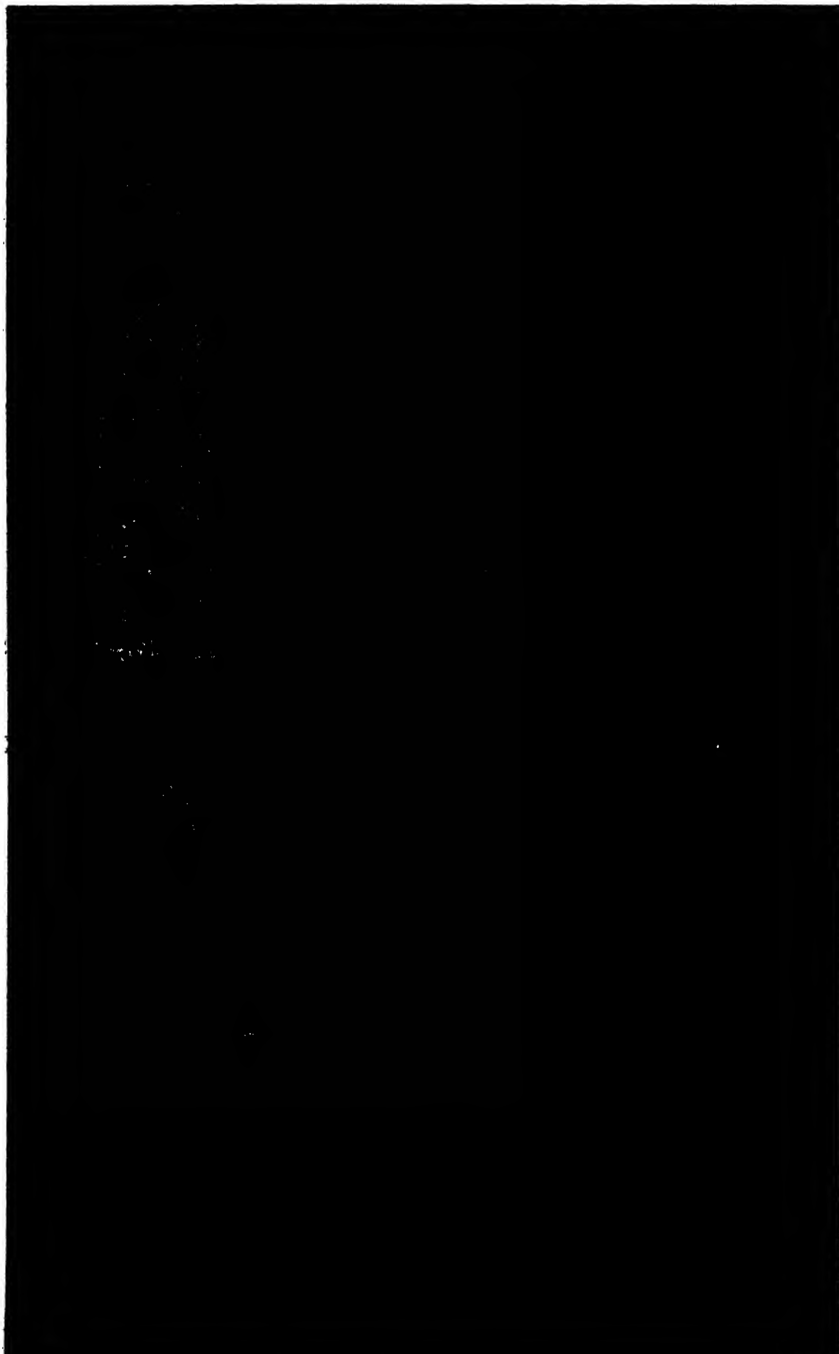


Pure-Bred Ears of "Eureka".

Maize Experiments at the Experimental Farm, Potchefstroom

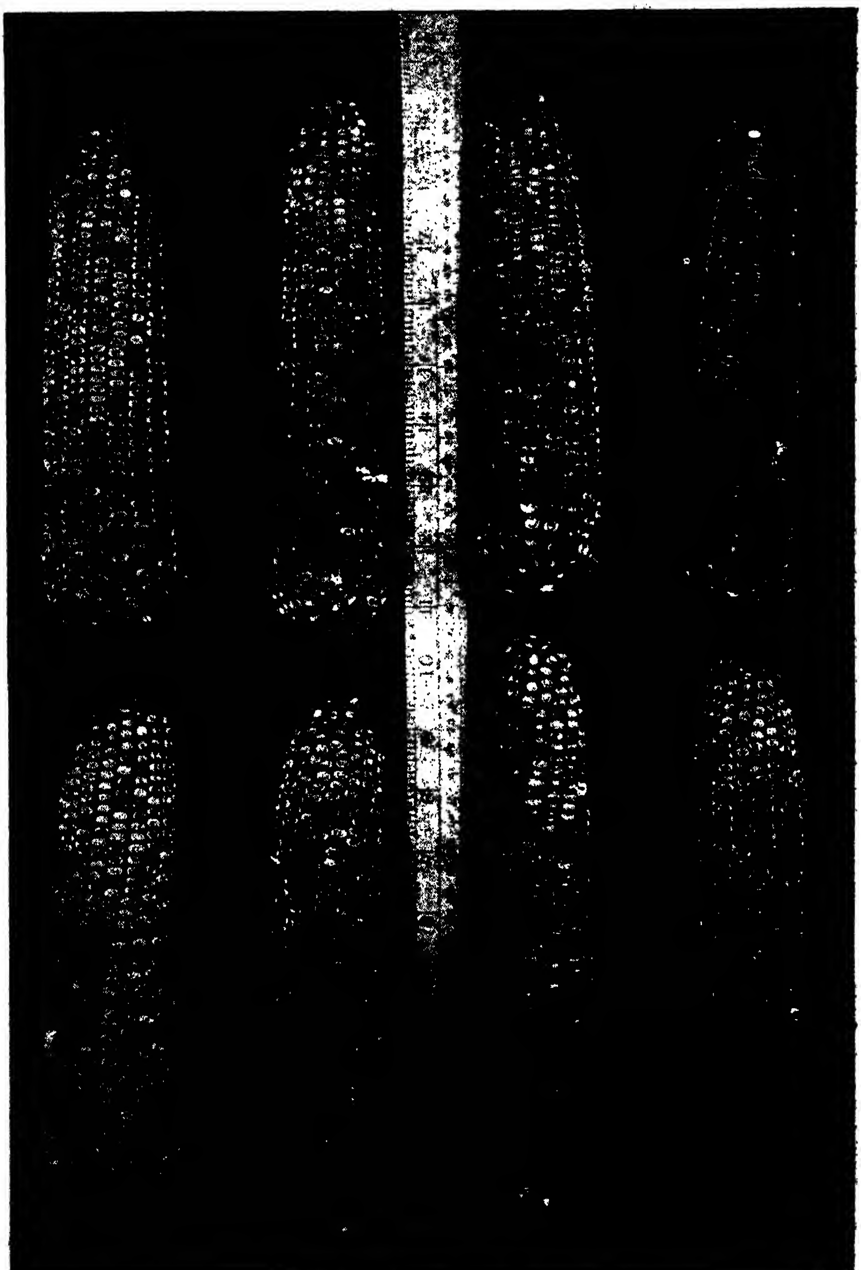
Two-Eared Stalk of "Eureka".

Maize Experiments at the Experimental Farm, Potchefstroom.



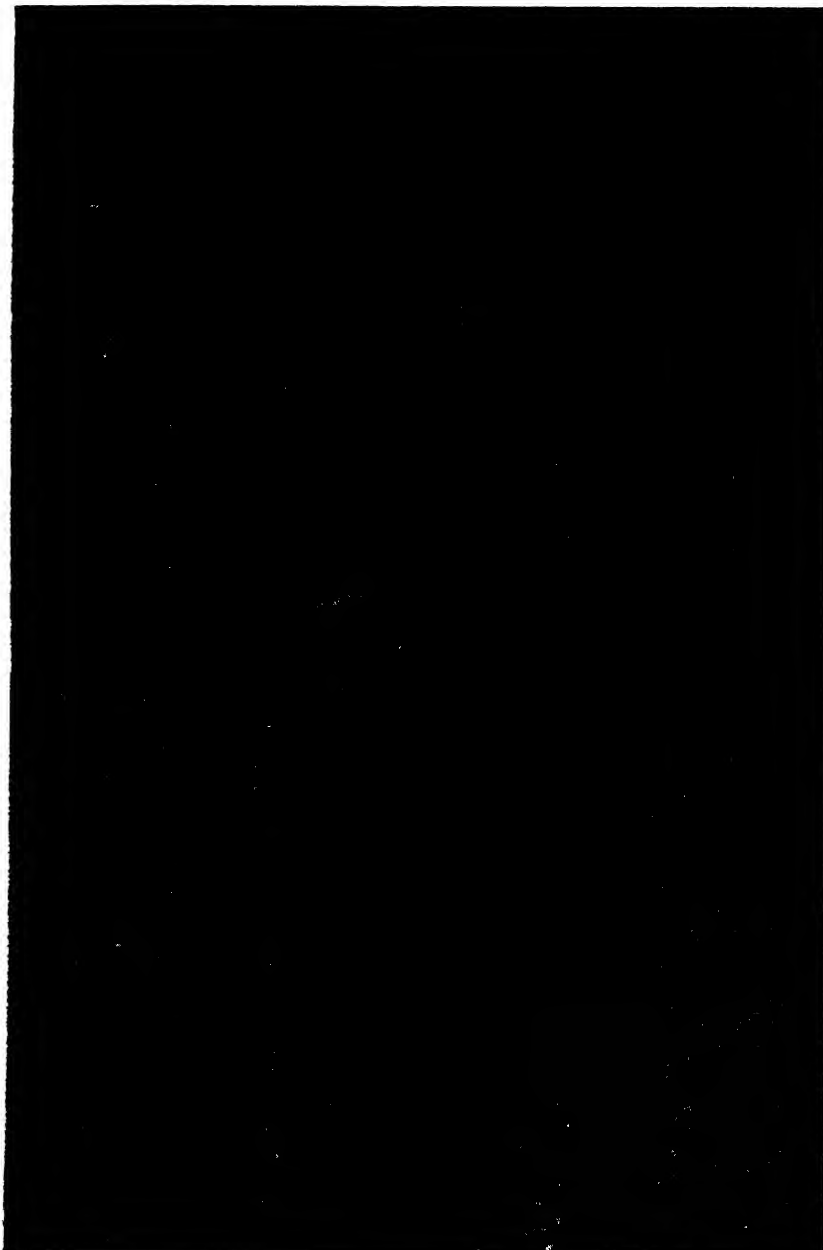
Pure-Bred Ears of "Iowa Silver Mine".

Maize Experiments at the Experimental Farm, Potchefstroom.



Pure-Bred Ears of "Chester County, Mammoth".

Maize Experiments at the Experimental Farm, Potchefstroom.



Pure-Bred Ears of "Johnston County White".

Registered Commercial Fertilizers.
1910-11 Season.

By Dr. C. F. Juritz, Acting Chief of the Division of Chemistry.

In the March issue of this journal I gave an account of the principles on which the Cape Fertilizer Act is based and of the requirements necessary to be fulfilled in compliance with the regulations that have been promulgated under the Act. One of those regulations (No. 1) provides that every fertilizer intended for sale within the Cape Province shall be registered with the Department of Agriculture; another regulation (No. 16) that samples of every registered fertilizer shall be taken for analysis at the instance of the Government at least once in every twelve months; another (No. 17) that all fertilizers imported into, or manufactured in, the Cape Province shall be subject to detention by any officer of the Customs or by some other authorized officer for the purpose of analysis; and a fourth regulation (No. 34) enjoins the periodical publication in the *Agricultural Journal* of the names, brands, and guaranteed composition of all registered fertilizers (together with the names of the manufacturers or importers), the results of the analyses, and such other information as circumstances may render desirable.

Up to the present there have been two publications of the list provided for by Regulation No. 34. One of these appeared in the *Cape Agricultural Journal* of July, 1909, and comprised in all eighty-seven fertilizers. A second list was published in the issue of the same journal for October, 1910, and included 219 fertilizers registered subsequently to the appearance of the former list. Since the 1910 list was printed there have been 249 further registrations, the details of which are given in the following pages.

This is, therefore, the first occasion on which a list of the fertilizers registered under the Cape Province law appears in the *Union Agricultural Journal*, and obviously the composition of these fertilizers, many of which are sold in every Province of the Union, is a matter of far wider interest than merely to the merchants and farmers of the Cape Province. The present publication of this list in the *Union Agricultural Journal* may indeed supply, to a certain extent, the lack of a Fertilizers Act, which must continue to be felt by the remaining Provinces until the time arrives when the Cape Act or some correlative statute shall embrace within its scope the entire Union.

When the last list of this kind was published occasion was taken to remark upon the distinct improvement in the organization and control of the fertilizer trade that had been brought about since July, 1909. This improvement has continued to make steady advance, but there is nevertheless much that calls for attention, points which it is my purpose to indicate later.

The list published in the *Cape Journal* of last October included all the fertilizers registered up to the 30th June, 1910. In the list

now printed will be found all fertilizers registered between the 1st July, 1910, and the 30th June, 1911. First of all, however, something by way of an addendum to last year's list is necessary. After the publication of that list analyses were made of ten fertilizers included therein, and to make the previous year's record complete the results of these analyses are here given, the registered composition of the several fertilizers to which they refer being reprinted from the *Cape Journal* of October, 1910.

CLASS III.—SUPERPHOSPHATES.

(Registered prior to 30th June, 1910.)

Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Total.	Lin
				%	%	%	%
—	Liberman & Buirski, Capetown	Superphosphate L.G. 12 per cent.	Ons Land	*12.4*	*13.0*	*13.3*	*15.76*
C.50	,,	,,	—	12.49	—	—	23.60
—	Thomson, Watson & Co., Capetown	Superphosphate M.H.G. 16 per cent.	Tiger	*16.0*	—	—	*26.0*
C.50	,,	,,	—	17.23	—	—	27.40
—	J. Leonhardt, Greatberg	Superphosphate H.G 17 per cent.	Albatross	*17.32*	*17.79*	*17.88*	*25.22*
C.50	,,	,, ,, ,,	,,	16.54	—	—	27.76
—	S. S. Lombard, Malmesbury	,, ,, ,,	,,	*17.58*	*18.13*	*18.25*	*25.34*
C.50	,,		—	17.47	—	—	27.35
—	Baumann & Co., Ltd., Ceres	Superphosphate H.G. 17½ per cent.	Baumann & Co.	*17.90*	*18.60*	*19.40*	*27.90*
C.50	,, ,,	,, ,,	—	17.00	—	—	27.16
—	A. Newmark, Napier	Superphosphate H.G. 17 per cent.	Joode	*17.20*	*17.80*	*18.40*	*27.40*
C.50	,,	,, ,,	—	16.91	—	—	26.19
—	B. P. J. Laing, Caledon	Superphosphate H.G. 17½ per cent.	B. P. J. Laing	*17.90*	*18.80*	*19.20*	*27.90*
C.50	,,	,, ,,	—	16.37	—	—	26.87
—	I. Newmark, Caledon	Superphosphate H.G. 17 per cent.	I. Newmark	*17.60*	*18.34*	*18.94*	*24.94*
C.55	,, ,,		—	17.53	18.15	18.15	26.77
—	,, ,,	Superphosphate L.G. 12 per cent.	I. Newmark	*12.22*	*13.03*	*13.61*	*26.30*
C.55	,,	,, ,,	—	11.65	12.16	13.24	26.94
—	Kahn, Noble & Co., Mossel Bay	Superphosphate M.H.G. 15 per cent.	St. Blaize	*15.30*	*16.0*	*16.50*	*25.30*
C.44/53	,, ,, ,,	,, ,, ,,	,,	12.29	—	15.12	25.00
C.56	,, ,, ,,	,, ,, ,,	,,	12.28	15.17	15.53	25.38

It has to be explained, with reference to the foregoing and following tables, that the letters C and G prefixed to the Laboratory folio number opposite each analysis indicate that such analyses were performed in the Capetown and Grahamstown Laboratories respectively. The guaranteed figures registered with respect to each fertilizer are printed in italics, thus, *23.50*. Where the analytical results found are appreciably below this guarantee the figures expressing such results are printed in thick black type, thus, **20.42**. Wherever the analytical figures are satisfactory they are printed in ordinary type, thus, 23.64.

A reference to the table of "limits of error" contained in No. 19 of the promulgated regulations* will sufficiently explain what is meant in the preceding paragraph by the analytical result falling "appreciably below" the guaranteed figure. In the following tabular summary, which precedes the more fully detailed tables given later on, the articles so referred to are grouped in the last column as "below grade".

The fertilizers registered between the 1st July, 1910, and the 30th June, 1911, are classified in the detailed tables according to their nature and general character. In the following preliminary table all these groups are summarized:—

Description.	Number registered.		Number analysed.		Number found Below Grade.	
I. Guanos and other natural organic fertilizers:—						
(*a*) Nitrogenous	8		0			
(*b*) Phosphatic	1		0			
		9		0		—
II. Basic slag, Thomas phosphate, etc.		33		18		1
III. Superphosphates:						
(*a*) Under strength	1		1		0	
(*b*) Low grade	12		9		1	
(*c*) Medium grade	3		3		1	
(*d*) Medium high grade	32		22		0	
(*e*) High grade...	79		53		3	
		127		88		5
IV. Double superphosphates		1		0		—
V. Dissolved bones, vitriolized bones, etc.... ...		3		0		—
VI. Steamed bones, bone ash, etc.		2		1		0
VII. Bone meal, bone dust, etc.		6		1		1
VIII. Dissolved guanos, etc.		1		1		0
IX. Blood fertilizers		1		0		—
X. Kainit		2		0		—
XI. Potash salts		13		6		0
XII. Nitrate of soda		3		2		0
XIII. Sulphate of ammonia		4		1		0
XIV. Mixed fertilizers		44		13		2
		249		131		9

The following abbreviations are used to denote the materials from which, according to the statements of the applicants for registration, the component parts of the fertilizers referred to have been derived:—Al. (Albuminoid), A. (Ammoniacal), B. (Bone), Bl. (Blood), Cl. (Chloride or Muriate), F. (Fish), Fl. (Flesh), G. (Guano), N. (Nitric or Nitrate), O. (Organic), S. (Sulphate).

* See *Union Gazette*, Proclamation No. 178 of 5th December, 1910.

One more remark is necessary before we pass on to the detailed tables. The composition registered in respect of any article which is tabulated in the following tables is merely that guaranteed by the persons who registered that article, and the Government does not—in giving publicity to such figures—accept any responsibility for their correctness, least of all where these figures have not been checked by analyses carried out in the Government Laboratories.

CLASS I.—GUANOS AND OTHER NATURAL ORGANIC FERTILIZERS.

(a) NITROGENOUS.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present	Form in which Potash is present.
				Registered 1st July to 31st December, 1910.	%	%	%	%	%	%	%	%		
1	—	Superintendent, Government Guano Islands, Capetown	Government Guano	Government Guano	—	3.20	10.55	—	10.59	11.86	1.93	10.48	G.	G.
				Registered 1st January to 30th June, 1911.										
2	—	South African Whaling Co., Ltd., Saldanha Bay	Union Brand Whale Guano	Union	—	.38	1.72	—	1.94	9.09	—	1.23	Fl.	—
3	—	" " "	Union Brand No. 1 Whale Manure	"	—	.24	7.00	—	14.00	5.77	—	19.46	Fl. & B.	—
4	—	" " "	Union Brand No. 2 Whale Manure	"	—	.29	5.24	—	9.98	6.88	—	13.38	"	—
5	—	Superintendent, Government Guano Islands, Capetown	Government Guano	Government Guano		3.91	9.88	—	9.88	11.94	2.33	8.87	G.	G.
6	—	" "	"	" "		3.53	11.10	—	11.10	11.41	2.47	10.16	"	"
7	—	South African Fertilizers Co., Durban	Safco Fish Guano	SAFCO		—	2.5	—	13.0	5.9	—	15.0	Fl. & B.	—
8	—	" " "	Safco Whale Guano	"	—	—	—	—	—	10.0	—	—	Fl.	—

(b) PHOSPHATIC.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.										
9	—	South African Fertilizers Co., Durban	Safco Guano Phosphate	SAFCO	—	—	12.0	—	26.0	.5	—	—	G.	—

CLASS II.—BASIC SLAG, THOMAS' PHOSPHATE, ETC.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present	Form in which Potash is present.
				Registered 1st July to 31st December, 1910.										
10	—	R. Wilson, Son, & Co., Capetown	Basic Slag	Eendracht	—	—	—	16.0	17.20	—	—	42.09	—	—
—	C.27	" "	" "	"	79.94	—	—	17.07	17.12		—	46.56	—	—
11	—	I. Newmark, Caledon	" "	I. Newmark, Caledon	84.70		—	15.46	17.05	—	—	49.90	—	—
—	C.9	"	" "	" "	84.62	—	11.42	15.68	16.43	—	—	47.20	—	
12	—	Dunn & Co., East London	" "	Globe		—	—	15.0	15.0	—	—	50.0	—	
13	—	Devine & Co., Paarl	Scotia Basic Slag	Paarl Klip	—		—	10.55	14.60	—	—	42.3	—	—
—	C.47	" " "	" "	" "	86.62	—	—	9.79	14.43	—	—	41.67	—	—

Class II.—Basic Slag, Thomas' Phosphate, Etc.—(continued).

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st July to 31st December, 1910.	%	%	%	%	%	%	%	%		
14	—	Liberman & Buirski, Capetown	Thomas Phosphate Powder	Ons Land	—	—	—	13.15	14.20	—	—	—	—	—
—	C.47	" "	" " "	"	75.03	—	—	12.05	13.12	—	—	41.62	—	—
—	C.47	Nelson & De Kock, per L. & B.	" " "	—	77.30	—	—	12.13	12.95	—	—	41.77	—	—
				Registered 1st January to 30th June, 1911.										
15	—	Woodhead, Plant & Co., Capetown	Thomas Phosphate Powder	Hout Kop (S.M. over P.)	91.0	—	—	15.29	16.72	—	—	46.47	—	—
—	C.59	" " "	" " "	" "	88.12	—	—	15.47	17.70	—	—	46.37	—	—
16	—	" " "	" " "	Hout Kop	89.6	—	—	13.73	17.10	—	—	46.88	—	—
—	C.75	" " "	" " "	"	77.26	—	—	16.18	19.07	—	—	51.93	—	—
17	—	C. Starke & Co., Ltd., Mowbray	Basic Slag	Kudu	—	—	—	14.20	17.40	—	—	45.00	—	—
18	—	Dunn & Co., East London	" "	Globe	—	—	—	15.0	15.0	—	—	50.0	—	—
19	—	Imperial Cold Storage and Supply Co., Ltd., Capetown	" "	Osvel	—	—	—	16.12	17.65	—	—	47.23	—	—
—	C.63	"	" "	"	77.70	—	—	16.14	18.67	—	—	46.24	—	—
20	—	Liberman & Buirski, Capetown	" "	Ons Land	76.5	—	—	14.59	16.63	—	—	50.37	—	—
—	C.81	P. J. de Jongh, Porterville Road	" "	—	—	—	—	14.68	17.27	—	—	47.74	—	—
21	—	Liberman & Buirski, Capetown	" "	Ons Land	81.0	—	—	12.86	14.15	—	—	41.27	—	—
—	C.75	G. W. T. Ranch	" "	—	76.34	—	—	13.80	14.65	—	—	53.62	—	—
22	—	Woodhead, Plant & Co., Capetown	Thomas Phosphate Powder	Hout Kop, Basson Bros.	81.9	—	—	13.02	16.11	—	—	47.05	—	—
—	C.89	Basson Bros., Moorreesburg	" " "	" "	95.8	—	—	10.79	16.11	—	—	57.43	—	—
23	—	F. B. Morice & Co., Capetown	Basic Slag	Morice	—	—	—	16.64	18.72	—	—	47.6	—	—
24	—	" " "	Bilston Slag	"	80.0	—	—	21.0	22.0	—	—	46.0	—	—
25	—	Imperial Cold Storage and Supply Co., Ltd., Capetown	Basic Slag	Osvel	—	—	—	10.76	15.73	—	—	45.89	—	—
26	—	Van Aarde & Co., Malmesbury	Thomas Phosphate	Red Stripe	—	—	—	14.50	16.00	—	—	45.30	—	—
—	C.81	" "	" "	—	—	—	—	14.71	15.36	—	—	56.60	—	—
27	—	A. J. Abrahamse & Sons, Capetown	" "	Abrahamse & Sons	83.0	—	—	15.18	16.50	—	—	54.0	—	—
—	C.75	" "	" "	" "	77.18	—	—	15.36	16.55	—	—	56.20	—	—
28	—	Van Aarde & Co., Malmesbury	" "	Red Stripe	—	—	—	13.00	14.33	—	—	42.00	—	—
29	—	I. Newmark, Caledon	Basic Slag	I. Newmark, Caledon	—	—	—	13.85	16.99	—	—	46.35	—	—
30	—	Rood, Penberthy & Co., Malmesbury	" "	Star	84.0	—	—	14.17	17.70	—	—	45.0	—	—
—	C.75	" "	" "	"	80.94	—	—	16.53	17.28	—	—	48.37	—	—
31	—	Crockart & Johnston, Port Elizabeth	Thomas' Phosphate	Elephant	—	—	—	13.40	16.10	—	—	45.00	—	—
—	G.15	" "	"	"	82.4	—	—	15.72	16.04	—	—	45.50	—	—
32	—	Woodhead, Plant & Co., Capetown	Thomas Phosphate Powder	Hout Kop	89.00	—	—	13.63	15.41	—	—	45.27	—	—
33	—	" " "	" " "	"	91.00	—	—	14.01	16.65	—	—	46.41	—	—
34	—	" " "	" " "	"	95.00	—	—	14.27	16.07	—	—	44.15	—	—
35	—	S. Zackon, Moorreesburg	Thomas Phosphate	Zackon	84.0	—	—	16.32	17.0	—	—	46.20	—	—
—	C.77	"	"	"	—	—	—	17.63	18.05	—	—	46.51	—	—
[illegible]	—	Woodhead, Plant & Co., Capetown	Thomas Phosphate Powder	Hout Kop	96.60	—	—	16.13	16.75	—	—	48.58	—	—

CLASS II.—BASIC SLAG, THOMAS' PHOSPHATE, ETC.—(*continued*).

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.	%	%	%	%	%	%	%	%		
37	—	Henry Ries, East London	Thomas Phosphate	Henries	—	—	—	*14.78*	*16.07*	—	—	*32.26*	—	—
38	—	South African Fertilizers Co., Durban	Safco Basic Slag	SAFCO	—	—	—	*16.0*	*20.0*	—	—	*45.0*	—	—
39	—	Woodhead, Plant & Co., Capetown	Thomas Phosphate Powder	Hout Kop	*93.60*	—	—	*15.10*	*16.67*	—	—	*41.75*	—	—
40	—	C. Searle & Co., Mossel Bay	Basic Slag	SA-CO	—	—	—	*14.80*	*18.49*	—	—	*46.40*	—	—
41	—	G. White & Sons, Port Elizabeth	" "	Three Star	—	—	—	*13.51*	*15.03*	—	—	*41.28*	—	—
—	C.21	"	Thomas Phosphate	Diamond	78.14	—	—	13.48	14.16	—	—	39.93	—	—
42	—	C. Starke & Co., Ltd., Mowbray	Basic Slag	Kudu	—	—	—	*14.00*	*17.09*	—	—	*45.00*	—	—
—	C.49	Prince, Vintcent & Co., Mossel Bay	" "	—	80.72	—	—	17.54	19.14	—	—	46.26	—	—

CLASS III.—SUPERPHOSPHATES.

(a) UNDER STRENGTH.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.										
43	—	Prince, Vintcent & Co., Mossel Bay	Fison's Superphosphate U.S.	Vinco	—	*10.99*	*11.46*	—	*12.54*	—	—	*14.46*	—	—
—	C.43	" " "	" "	"	—	12.20	—	—	—	—	—	23.42	—	—

(b) LOW GRADE.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st July to 31st December, 1910.										
44	—	Smuts & Koch, Malmesbury	Superphosphate L.G. 12 per cent.	Penguin	—	*14.18*	*15.10*	—	*15.10*	—	—	—	—	—
—	C.16	" " "	" "	Duck	—	11.74	13.33	—	13.33	—	—	20.54	—	—
				Registered 1st January to 30th June, 1911.										
45	—	F. H. Laing, Caledon	" "	F. H. Laing	—	*12.30*	*13.30*	—	*13.45*	—	—	*18.10*	—	—
—	C.86	"	" "	"	—	12.36	—	—	13.18	—	—	21.00	—	—
46	—	J. Hartford & Co., Caledon	" "	Diamond	—	*12.00*	*12.40*	—	*12.70*	—	—	*21.00*	—	—
—	C.81	"	" "	—	—	10.44	12.55	—	13.38	—	—	19.83	—	—
47	—	Stephan Bros., Capetown	" "	Bester	—	*12.10*	*12.60*	—	*13.00*	—	—	*23.05*	—	—
—	C.81	"	" "	"	—	10.85	12.40	—	13.43	—	—	21.47	—	—
48	—	Kaplan Bros., Bot River	" "	Springbok	—	*12.60*	*13.79*	—	*14.10*	—	—	*18.50*	—	—
—	C.86	"	" "	"	—	11.99	13.35	—	13.38	—	—	21.43	—	—
49	—	Kahn, Noble & Co., Ltd., Mossel Bay	" "	St. Blaize	—	*12.28*	*15.17*	—	*16.53*	—	—	*25.88*	—	—

CLASS III.—SUPERPHOSPHATES—(continued).

(b) LOW GRADE—(continued).

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.	%	%	%	%	%	%	%	%		
50	—	Woodhead, Plant & Co., Capetown	Superphosphate L.G. 12 per cent.	Hout Kop (G.R.V. over R)	—	13.0	11.50	—	14.90	—	—	20.10	—	—
51	—	B. P. J. Laing, Caledon	,, ,,	B. P. J. Laing, Caledon	—	12.60	13.60	—	14.00	—	—	18.60	—	—
—	C.72	,, ,,	,, ,,	,, ,,	—	12.15	—	—	—	—	—	21.13	—	—
52	—	I. Newmark, Caledon	,, ,,	I. Newmark, Caledon	—	12.03	12.53	—	12.83	—	—	20.58	—	—
—	C.65	,, ,,	,, ,,	,, ,,	—	12.12	—	—	—	—	—	26.35	—	—
53	—	A. Newmark, Napier	,, ,,	Joode	—	12.02	12.40	—	12.70	—	—	21.00	—	—
—	C.77	,, ,,	,, ,,	,,	—	11.47	—	—	15.76	—	—	27.27	—	—
54	—	,, ,,	,, ,,	Bennett & Louw	—	12.02	12.40	—	12.70	—	—	21.00	—	—
55	—	Coetzee & Co., Drew	,, ,,	Coetzee & Co.	—	12.01	12.25	—	12.60	—	—	21.00	—	—
—	C.91	,, ,,	,, ,,	Os kop	—	11.75	14.33	—	14.81	—	—	24.38	—	—

(c) MEDIUM GRADE.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.										
56	—	Kaplan Bros., Bot River	Superphosphate M.G. 14 per cent.	Springbok	—	14.80	15.89		16.10	—	—	22.0	—	—
—	C.86	,, ,,	,, ,,	,,	—	13.37	14.73	—	14.89	—	—	23.83	—	—
57	—	Mataré, Bruns & Co., Mossel Bay	Superphosphate M.G. 14½ per cent.	Embeco	—	14.90	15.30	—	15.70	—	—	23.65	—	—
—	C.39	,, ,,	,, ,,	,,	—	15.18	—	—	—		—	22.71	—	—
58	—	Coetzee & Co., Drew	Superphosphate M.G. 13 per cent.	Coetzee & Co.	—	13.05	13.40	—	13.70	—	—	22.00	—	—
—	C.91	,, ,,	,, ,,	Os Kop	—	12.87	14.60	—	15.40	—	—	25.38	—	—

(d) MEDIUM HIGH GRADE.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st July to 31st December, 1910.										
59	—	Mackie, Dunn & Co., Port Elizabeth	Superphosphate M.H.G. 16 per cent.	Globe	—	16.04	16.49	—	16.49	—	—	20.0	—	—
60	—	Smuts & Koch, Malmesbury	Superphosphate M.H.G. 16½ per cent.	Penguin	—	17.45	18.25	—	18.37	—	—	—	—	—
—	C.16	,, ,, ,,	,, ,,	Duck	—	16.39	17.55	—	17.55	—	—	25.53	—	—

CLASS III.—SUPERPHOSPHATES—(*continued*).

(*d*) MEDIUM HIGH GRADE—(*continued*).

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st July to 31st December, 1910.	%	%	%	%	%	%	%	%		
61	—	M. Choritz, Bot River	Superphosphate M.H.G. 16½ per cent.	Bot	—	17.45	18.25	—	18.37	—	—	—	—	—
—	C.40	" "	Superphosphate M.H.G. 16½–17½ per cent.	Joode	—	16.99	—	—	—	—	—	25.50	—	—
62	—	" "	Superphosphate M.H.G. 16½ per cent.	Bot	—	16.85	17.66	—	17.80	—	—	—	—	—
—	C.77	" "	" "	Joode	—	16.85	—	—	—	—	—	27.55	—	—
63	—	Malcomess & Co., Ltd., East London	" "	Malcomess	—	16.70	17.60	—	18.10	—	—	26.83	—	—
—	G.9	" " "	" "	Buffalo	—	15.75	—	—	17.12	—	—	25.00	—	—
				Registered 1st January to 30th June, 1911.										
64	—	H. Ries, East London	Ben Hur Superphosphate M.H.G. 16 per cent.	Henries	—	16.67	—	—	—	—	—	19.64	—	—
65	—	A. J. Abrahamse & Sons, Capetown	Superphosphate M.H.G. 16 per cent.	Abrahamse & Sons	—	16.0	17.0	—	17.0	—	—	20.06	—	—
—	C.66	" " "	" "	Odam's	—	15.95	—	—	—	—	—	25.67	—	—
—	C.77	Van Blommestein & Metcalfe, Caledon	" "	"	—	16.00	—	—	—	—	—	26.25	—	—
—	C.77	" " "	" "	"	—	15.77	—	—	18.83	—	—	26.73	—	—
66	—	Woodhead, Plant & Co., Capetown	Superphosphate M.H.G. 16½ per cent.	Hout Kop (C. J. du P. over B)	—	16.60	17.80		18.40	—	—	23.95	—	—
—	C.68	C. J. du Plessis, Bredasdorp	" "	" "	—	16.36	—	—	—	—	—	25.14	—	—
67	—	Mackie, Dunn & Co., Port Elizabeth	Superphosphate M.H.G. 16 per cent.	Globe	—	16.04	16.49	—	16.49	—	—	20.0	—	—
68	—	R. M. Ross & Co., Capetown	" "	Tiger	—	16.0	—	—	—	—	—	26.0	—	—
—	C.77	" "	" "	"	—	16.46	—	—	18.65	—	—	27.27	—	—
69	—	Imperial Cold Storage and Supply Co., Ltd., Capetown	" "	Osvel	—	16.50	17.80	—	17.90	—	—	24.0	—	—
—	C.68	" " "	" "	"	—	16.76	—	—	—	—	—	24.76	—	—
70	—	" "	" "	"	—	16.80	17.80	—	18.0	—	—	23.7	—	—
71	—	Malcomess & Co., Ltd., East London	Superphosphate M.H.G. 15½ per cent.	Malcomess A	—	15.87	16.76	—	16.94	—	—	26.83	—	—
72	—	F. B. Morice & Co., Capetown	Superphosphate M.H.G. 16 per cent.	Morice	—	16.30	17.0	—	17.0	—	—	20.6	—	—
73	—	M. Kalm, Warren's Camp	Superphosphate M.H.G. 16½ per cent.	M. Kalm, Warren's Camp	—	16.90	17.90	—	18.00	—	—	23.80	—	—
—	C.72	" "	" "	" "	—	17.15	—	—	—			25.77		
74	—	I. Newmark, Caledon	Superphosphate M.H.G. 16 per cent.	I. Newmark, Caledon	—	16.29	17.47	—	17.98		—	25.36		—
—	C.62	" "	" "	" "	—	16.14	—	—	—	—	—	25.60	—	—
—	C.72	" "	" "	" "	—	15.49	16.97	—	17.12	—	—	25.44	—	—

CLASS III.—SUPERPHOSPHATES—(*continued*).

(*d*) MEDIUM HIGH GRADE—(*continued*).

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide.				Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
						Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.					
				Registered 1st January to 31st December, 1910.	%	%	%	%	%	%	%	%		
75	—	A. J. Abrahamse & Sons, Capetown	Superphosphate M.H.G. 16¼ per cent.	Abrahamse & Sons...	—	17.19	17.30	—	17.42	—	—	25.27	—	—
—	C.77	,, ,,	,,	,, ,,	—	16.04	17.57	—	17.70	—	—	25.27	—	—
76	—	Dunn & Co., East London	Superphosphate M.H.G. 16 per cent.	Globe	—	16.04	—	—	16.04	—	—	20.00	—	—
77	—	C. Starke & Co., Ltd., Mowbray	,, ,,	Kudu	—	16.26	17.13	—	17.65	—	—	23.00	—	—
—	C.68	,, ,, ,,		,,	—	15.93	—	—	—	—	—	25.67	—	—
78	—	S. Efroiken, Bellville	Superphosphate M.H.G. 16¼ per cent.	Par Excellence	—	17.61	18.56	—	18.87	—	—	24.74	—	—
79	—	C. Searle & Co., Mossel Bay	Superphosphate M.H.G. 15.69 per cent.	JEF-CO	—	15.69	16.14	—	17.09	—	—	25.62	—	—
—	C.46	,, ,, ,,	Superphosphate	Forest		14.67	—	—	—	—	—	24.00	—	—
—	C.46	,, ,, ,,	,,	—	—	14.93	—	—	—	—	—	24.43	—	—
80	—	,, ,, ,,	Superphosphate M.H.G. 16.17 per cent.	SA-CO	—	16.17	16.69	—	17.23	—	—	25.56	—	—
—	C.45	,, ,, ,,	,,	Ohlendorff		16.22	—	—	—	—	—	24.44	—	—
81	—	R. Wilson, Son & Co., Capetown	Odam's Superphosphate M.H.G. 16 per cent.	Phoenix		16.18	17.55	—	17.55	—	—	20.00	—	—
82	—	,, ,, ,,	,,	,,	—	16.82	18.24	—	18.24	—	—	20.00	—	—
83	—	C. Searle & Co., Mossel Bay	Superphosphate M.H.G. 16.28 per cent.	SA-CO	—	16.28	16.99	—	17.13	—	—	25.37	—	—
84	—	C. Starke & Co., Ltd., Mowbray	Superphosphate M.H.G. 16 per cent.	Kudu	—	16.00	16.50	—	17.00	—	—	23.00	—	—
—	C.91	,, ,, ,,	,,	,,	—	16.01	16.76	—	17.01	—	—	25.30	—	—
85	—	Hudson, Vreede & Co., Mossel Bay	Superphosphate M.H.G. 15 per cent.	Star	—	15.01	15.25	—	15.50	—	—	23.00	—	—
86	—	Coetzee & Co., Drew	,, ,,	Coetzee & Co.	—	15.05	15.40	—	15.70	—	—	23.00	—	—
—	C.91	,, ,,	,,	Os Kop	—	15.49	17.10	—	17.88	—	—	25.10	—	—
87	—	R. M. Ross & Co., Capetown	Superphosphate M.H.G. 16 per cent.	Tiger	—	16.0	17.0	—	17.5	—	—	26.0	—	—
88	—	G. White & Sons, Port Elizabeth	Superphosphate M.H.G. 15 per cent.	Three Star	—	15.0	17.44	—	17.48	—	—	26.20	—	—
89	—	Malcomess & Co., Ltd., East London	Superphosphate M.H.G. 15¼ per cent.	Malcomess "A"	—	16.04	16.98	—	17.14	—	—	25.28	—	—
90	—	Nelson & De Kock, Malmesbury	Superphosphate M.H.G. 16¼ per cent.	Nelson & De Kock	—	16.76	—	—	17.3	—	—	27.34	—	—
—	C.77	,, ,, ,,	Superphosphate M.H.G. 16 per cent.	,, ,,	—	16.76	—	—	—	—	—	27.34	—	—
—	C.77	,, ,, ,,	,, ,,	,, ,,	—	16.74	—	—	—	—	—	27.17	—	—

CLASS III.—SUPERPHOSPHATES—(*continued*).

(*e*) HIGH GRADE.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st July to 31st December, 1910.	%	%	%	%	%	%	%	%		
91	—	C. Searle & Co., Mossel Bay	Superphosphate H.G. 17½ per cent.	Ohlendorff's	—	*17.60*	*18.14*	—	*18.64*	—	—	*25.19*	—	—
92	—	Cereal Manufacturing Co., Moorreesburg	Superphosphate H.G. 17.3 per cent.	Jungle	—	*17.30*	*17.55*	—	*18.45*	—	—	*26.47*	—	—
—	C.19	" " "	" "	"	—	17.00	18.96	—	18.96	—	—	26.44	—	—
93	—	Woodhead, Plant & Co., Capetown	Superphosphate H.G. 17 per cent.	Hout Kop	—	*17.60*	*19.00*	—	*19.30*	—	—	*25.20*	—	—
—	C.52	" " "	" "	"	—	17.35	—	—	—	—	—	26.92	—	—
—	C.58	" " "	" "	"	—	18.22	—	—	21.04	—	—	25.75	—	—
				Registered 1st January to 30th June, 1911.										
94	—	Liberman & Buirski, Capetown	Superphosphate H.G. 17.2 per cent.	Ons Land	—	*17.68*	*18.34*	—	*18.52*	—	—	*23.74*	—	—
—	C.68	Joseph Sacks, Bredasdorp	" "	Golden Sacks	—	17.03	—	—	—	—	—	25.87	—	—
—	C.77	Luyt & Co., Ceres	" "	Ons Land	—	16.28	17.86	—	17.90	—	—	24.77	—	—
95	—	Liberman & Buirski, Capetown	Superphosphate H.G. 18 per cent.	"	—	*18.42*	*19.36*	—	*19.54*	—	—	*25.81*	—	—
—	C.72	" " "	" "	"	—	17.75	19.08	—	19.27	—	—	26.99	—	—
—	C.77	" " "	" "	"	—	18.20	—	—	20.14	—	—	27.82	—	—
96	—	Woodhead, Plant & Co., Capetown	Superphosphate H.G. 17 per cent.	Hout Kop	—	*17.49*	*18.60*	—	*19.0*	—	—	*24.35*	—	—
—	C.68	" " "	" "	"	—	17.10	—	—	—	—	—	26.35	—	—
97	—	" " "	Superphosphate H.G. 18 per cent.	"	—	*18.20*	*19.30*	—	*19.50*	—	—	*25.45*	—	—
—	C.68	" " "	" "	"	—	18.52	—	—	—	—	—	26.86	—	—
98	—	" " "	Superphosphate H.G. 17 per cent.	Hout Kop (C. J. du P. over B)	—	*17.30*	*18.30*	—	*18.50*	—	—	*24.10*	—	—
99	—	Joseph Sacks, Bredasdorp	" "	Golden Sacks	—	*17.40*	*18.40*	—	*18.60*	—	—	*24.15*	—	—
—	C.68	" "	" "	"	—	17.20	—	—	—	—	—	25.65	—	—
100	—	J. Leonhardt, Greatberg	" "	J. Leonhardt	—	*17.03*	*17.10*	—	*17.40*	—	—	*25.00*	—	—
—	C.68	" "	" "	Albatross	—	16.50	—	—	—	—	—	25.57	—	—
—	C.77	" "	" "		—	17.28	—	—	—	—	—	26.88	—	—
101	—	A. Newmark, Napier	" "	Joode	—	*17.11*	*17.44*	—	*17.69*	—	—	25.00	—	—
—	C.72	" "	" "	"	—	16.37	17.32	—	17.32	—	—	26.76	—	—
102	—	Bennett & Louw, Bredasdorp	Superphosphate H.G. 17.2 per cent.	Du Toit's	—	*17.68*	*18.34*	—	*18.52*	—	—	*23.74*	—	—
103	—	Kaplan Bros., Bot River	" "	Springbok	—	*17.68*	*18.34*	—	*18.52*	—	—	*23.74*	—	—

CLASS III.—SUPERPHOSPHATES—(*continued*).

(c) HIGH GRADE—(*continued*).

Serial No.	Laboratory Folio No.	Manufacturer, Vender, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present
				Registered 1st January to 30th June, 1911.	%	%	%	%	%	%	%	%		
104	—	De Greeff & Visser, Malmesbury....	Superphosphate H.G. 17 per cent.	De Greeff & Visser.....	—	*17.02*	*17.20*	—	*17.35*	—	—	*25.00*	—	—
—	C.68	" "	" "	"	—	17.12	—	—	—	—	—	25.86	—	—
105	—	F. H. Laing, Caledon.............	Superphosphate H.G. 18 per cent.	F. H. Laing..........	—	*18.53*	*19.46*	—	*19.80*	—	—	*26.40*	—	—
106	—	" "	Superphosphate H.G. 17½ per cent.	"	—	*18.10*	*19.11*	—	*19.30*	—	—	*25.40*	—	—
107	—	J. Hartford & Co., Caledon........	Superphosphate H.G. 17 per cent.	Diamond.............	—	*17.50*	*17.70*	—	*18.10*	—	—	*26.00*	—	—
—	C.64	" " "	" "	"	—	18.04	—	—	—	—	—	28.27	—	—
108	—	Van Aarde & Co., Malmesbury.....	Superphosphate H.G. 18 per cent.	Red Stripe............	—	*18.10*	*18.51*	—	*19.02*	—	—	*25.11*	—	—
—	C.72	" " "	" "	"	—	17.52	—	—	—	—	—	28.84	—	—
—	C.81	" " "	" "	"	—	17.26	18.93	—	18.93	—	—	25.67	—	—
109	—	Imperial Cold Storage & Supply Co., Ltd., Capetown	" "	Osvel.................	—	*18.30*	*19.40*	—	*19.50*	—	—	*25.40*	—	—
—	C.68	" " "	" "	"	—	18.01	—	—	—	—	—	26.96	—	—
110	—	" " "	" "	"	—	*18.50*	*19.70*	—	*20.10*	—	—	*26.30*	—	—
111	—	F. H. Laing, Caledon.............	Superphosphate H.G. 17.2 per cent.	Pekkards.............	—	*17.68*	*18.34*	—	*18.52*	—	—	*23.74*	—	—
—	C.68	" "	" "	"	—	17.42	—	—	—	—	—	25.38	—	—
—	C.68	" "	" "	"	—	17.28	17.95	—	17.95	—	—	24.10	—	—
112	—	Kaplan Bros., Bot River..........	Superphosphate H.G. 17½ per cent.	Springbok............	—	*17.89*	*18.90*	—	*19.10*	—	—	*25.20*	—	—
—	C.68	" "	" "	"	—	17.82	—	—	—	—	—	25.52	—	—
113	—	Hermon Farmers' Trading Co., Ltd., Hermon	Hermon Farmers' Trading Co., Ltd. Superphosphate H.G. 17 per cent.	Hermon Farmers' Trading Co., Ltd.	—	*17.33*	*17.68*	—	*17.90*	—	—	*25.0*	—	—
—	C.72	" "	" "	" "	—	16.40	17.59	—	17.78	—	—	27.39	—	—
114	—	Liberman & Buirski, Capetown.....	Superphosphate H.G. 17½ per cent.	Ons Land.............	—	*17.90*	19.00	—	*19.16*	—	—	*25.43*	—	—
—	C.72	" " "	" "	"	—	17.43	—	—	—	—	—	26.39	—	—
115	—	B. Lawrence & Co., Ltd., Capetown	Superphosphate H.G. 17 per cent.	Reliance..............	—	*17.14*	*17.61*	—	*17.75*	—	—	—	—	—
—	C.86	" "	" "	—	—	15.84	17.07	—	17.07	—	—	25.60	—	—
116	—	F. B. Morice & Co., Capetown.....	Odam's Phoenix Superphoshate H.G. 17 per cent.	Morice................	—	*17.30*	*18.60*	—	*19.0*	—	—	*26.0*	—	—

CLASS III.—SUPERPHOSPHATES—(*continued*).

(e) HIGH GRADE—(*continued*).

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.	%	%	%	%	%	%	%	%		
117	—	Baumann & Co., Ltd., Ceres.......	Superphosphate H.G. 17½ per cent.	Baumann & Co., Ltd., Ceres	—	*18.10*	*19.00*	—	*19.20*	—	—	*25.70*	—	—
—	C.68	,, ,, ...	,, ,,	—	—	17.70	—	—	—	—	—	25.27	—	—
118	—	S. Machanik, Piquetberg..........	,, ,,	S. Machanik..........	—	*18.10*	*19.20*	—	*19.30*	—	—	*25.60*	—	—
119	—	Nelson & De Kock, Malmesbury....	,, ,,	Nelson & De Kock, Malmesbury	—	*18.20*	*19.30*	—	*19.70*	—	—	*26.10*	—	—
120	—	F. H. Laing, Caledon.............	,, ,,	F. H. Laing, Caledon...	—	*18.0*	*19.0*	—	*19.10*	—	—	*25.10*	—	—
121	—	,, ,, ...	,, ,,	F. H. Laing, Pekkard, Caledon	—	*17.80*	*18.80*	—	*19.10*	—	—	*25.0*	—	—
—	C.77	,, ,, ...	,, ,,	Pekkard.............	—	17.93	—	—	—	—	—	26.24	—	—
122	—	,, ,, ...	Superphosphate H.G. 18 per cent.	F. H. Laing, Caledon...	—	*18.50*	*19.80*	—	*20.30*	—	—	*26.70*	—	—
123	—	D. M. Tomlinson, Swellendam......	Superphosphate H.G. 17½ per cent.	D. M. Tomlinson, Swellendam	—	*17.80*	*18.90*	—	*19.10*	—	—	*25.0*	—	—
124	—	Nelson & De Kock, Malmesbury....	,, ,,	Nelson & De Kock....	—	*18.10*	*19.10*	—	*19.20*	—	—	*25.25*	—	—
—	C.77	,, ,, ,, ...	,, ,,	,, ...	—	17.44	18.62	—	18.73	—	—	26.18	—	—
125	—	B. P. J. Laing, Caledon..........	,, ,,	B. P. J. Laing, Caledon	—	*18.00*	*19.20*	—	*19.40*	—	—	*25.40*	—	—
126	—	S. S. Lombard, Malmesbury........	Superphosphate H.G. 17 per cent.	Red Cross...........	—	*17.33*	*17.93*	—	*18.25*	—	—	*27.37*	—	—
—	C.68	,, ,, ...	,, ,,	—	—	17.57	—	—	—	—	—	26.68	—	—
—	C.90	,, ,, ...	,, ,,	—	—	18.87	—	—	20.39	—	—	26.49	—	—
127	—	Van Aarde & Co., Malmesbury.....	Superphosphate H.G. 17½ per cent.	Red Stripe............	—	*17.54*	*17.87*	—	*18.09*	—	—	*25.00*	—	—
128	—	Stephan Bros., Capetown..........	Superphosphate H.G. 17 per cent.	Bester................	—	*17.01*	*17.15*	—	*17.40*	—	—	*25.00*	—	—
—	C.81	,, ,, ...	,, ,,	,, ...	—	15.77	17.27	—	17.27	—	—	26.25	—	—
129	—	Lensvelt, Wisdom & Co., Ltd., Capetown	Superphosphate H.G. 18 per cent.	Albatross.............	—	*18.01*	*18.10*	—	*18.25*	—	—	*26.00*	—	—
—	C.81	,, ,, ,,	,, ,,	,, ...	—	17.11	18.27	—	18.27	—	—	26.43	—	—
130	—	Nolte Bros., Somerset West.......	Superphosphate H.G. 17 per cent.	Nolte Bros...........	—	*17.70*	*19.0*	—	*19.50*	—	—	*26.20*	—	—
—	C.77	,, ,, ,, ...	,, ,,	,, ...	—	17.30	—	—	19.14	—	—	26.35	—	—
131	—	Woodhead, Plant & Co., Capetown	,, ,,	Hout Kop............	—	*17.40*	*18.70*	—	*19.50*	—	—	*25.60*	—	—
132	—	,, ,, ,,	Superphosphate H.G. 18 per cent.	,, ...	—	*18.70*	*20.0*	—	*20.40*	—	—	*26.90*	—	—
133	—	,, ,, ,,	,, ,,	,, ...	—	*18.60*	*19.90*	—	*20.30*	—	—	*26.50*	—	—
134	—	,, ,, ,,	Superphosphate H.G. 17 per cent.	Hout Kop (Basson Bros., Moorreesburg)	—	*17.70*	*19.0*	—	*19.40*	—	—	*25.25*	—	—

CLASS III.—SUPERPHOSPHATES—(*continued*).

(*e*) HIGH GRADE—(*continued*).

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911	%	%	%	%	%	%	%	%		
135	—	Joseph Sacks, Bredasdorp	Superphosphate H.G. 17.2 per cent.	Golden Sacks	—	17.68	18.34	—	18.52	—	—	23.74	—	—
136	—	B. P. J. Laing, Caledon	Superphosphate H.G. 17½ per cent.	B. P. J. Laing, Caledon	—	17.89	18.80	—	19.00	—	—	25.10	—	—
137	—	" "	Superphosphate H.G. 18 per cent.	" "	—	18.60	19.80	—	20.30	—	—	26.80	—	—
—	C.88	" "	" "	" "	—	17.78	19.20	—	19.20	—	—	26.06	—	—
138	—	Bennett & Louw, Bredasdorp	Superphosphate H.G. 17 per cent.	Du Toit's	—	17.01	17.20	—	17.60	—	—	25.00	—	—
—	C.81	" " "	" "	—	—	16.07	16.94	—	16.94	—	—	26.19	—	—
139	—	Abel Newmark, Capetown	" "	H. Taylor	—	17.01	17.50	—	17.70	—	—	26.00	—	—
—	C.72	H. Taylor, Bredasdorp	" "	"	—	17.95	—	—	—	—	—	27.17	—	—
140	—	S. van Biene, Malmesbury	" "	S. van Biene	—	17.01	17.30	—	17.50	—	—	25.00	—	—
—	C.77	" "	" "		—	17.45	—	—	—	—	—	27.75	—	—
141	—	Kahn, Noble & Co., Ltd., Mossel Bay	Superphosphate H.G. 17½ per cent.	St. Blaize	—	17.50	17.70	—	17.90	—	—	26.00	—	—
142	—	Rood, Penberthy & Co., Malmesbury	Superphosphate H.G. 17½ per cent.	Koorngerf	—	17.25	17.40	—	18.0	—	—	20.0	—	—
—	C.68	" " "	Superphosphate H.G. 17½ per cent.	"	—	17.58	—	—	—	—	—	25.56	—	—
143	—	" " "	Superphosphate H.G. 17½ per cent.	"	—	17.25	18.55	—	18.70	—	—	20.0	—	—
144	—	" " "	" "	"	—	17.25	17.70	—	17.85	—	—	18.0	—	—
145	—	I. Newmark, Caledon	Superphosphate H.G. 17 per cent.	I. Newmark, Caledon	—	17.52	18.08	—	18.39	—	—	26.13	—	—
—	C.81	" "	" "	" "	—	16.56	20.42	—	20.42	—	—	25.55	—	—
—	C.67	" "	" "	" "	—	16.27	17.95	—	17.95	—	—	26.67	—	—
—	C.72	" "	" "	" "	—	16.30	17.57	—	17.86	—	—	26.08	—	—
146	—	I. Droomer, Riebeek West	" "	I. Droomer	—	17.01	17.20	—	17.40	—	—	25.00	—	—
—	C.81	" "	" "	Albatross	—	15.90	16.78	—	16.78	—	—	25.86	—	—
147	—	Smuts & Koch, Ltd., Malmesbury	" "	Penguin	—	17.30	17.59	—	17.71	—	—	—	—	—
—	C.86	" " "	" "	—	—	16.13	17.63	—	17.71	—	—	25.84	—	—
148	—	Woodhead, Plant & Co., Capetown	" "	Hout Kop	—	17.20	18.50	—	18.80	—	—	25.00	—	—
149	—	" " "	Superphosphate H.G. 18 per cent.	"	—	18.40	19.70	—	20.00	—	—	26.10	—	—
150	—	F. B. Morice & Co., Capetown	" "	Morice	—	18.0	19.0	—	19.80	—	—	26.0	—	—
—	C.77	—	" "	Odam's	—	18.29	—	—	—	—	—	28.25	—	—

CLASS III.—SUPERPHOSPHATES—(*continued*).

(*e*) HIGH GRADE—(*continued*).

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.	%	%	%	%	%	%	%	%		
151	—	Basson Bros., Moorreesburg	Superphosphate H.G. 17 per cent.	Basson Bros.	—	17.91	17.10	—	17.20	—	—	25.00	—	—
—	C.81	" "	"	"	—	16.18	21.18	—	21.18	—	—	26.69	—	—
—	C.40	" "	Superphosphate M.H.G. 16½–17¼ per cent.	"	—	17.05	—	—	—	—	—	25.84	—	—
152	—	S. Will, Elm	Superphosphate H.G. 17 per cent.	S. Will	—	17.01	17.10	—	17.39	—	—	25.00	—	—
—	C.77	"	" "	"	—	16.66	—	—	17.24	—	—	26.45	—	—
153	—	Bennett & Louw, Bredasdorp	" "	Du Toit's	—	17.20	17.70	—	18.10	—	—	26.95	—	—
154	—	Rood, Penberthy & Co., Malmesbury	Superphosphate H.G. 17¼ per cent.	Koorngerf	—	17.23	17.63	—	18.10	—	—	20.00	—	—
155	—	S. Zackon, Moorreesburg	Superphosphate H.G. 17 per cent.	Zackon	—	17.29	17.41	—	17.53	—	—	—	—	—
—	C.16	" "	" "	"	—	16.81	17.68	—	17.68	—	—	25.07	—	—
—	C.77	" "	" "	"	—	16.81	—	—	18.04	—	—	26.39	—	—
156	—	M. Choritz, Bot River	" "	Boer	—	17.19	17.45	—	17.60	—	—	—	—	—
—	C.81	" "	" "	—	—	16.71	—	—	18.37	—	—	24.69	—	—
157	—	I. Friedland, Mossel Bay	" "	Hout Kop	—	17.45	18.50	—	19.00	—	—	24.20	—	—
158	—	Woodhead, Plant & Co., Capetown	" "	"	—	17.49	18.50	—	18.70	—	—	24.90	—	—
159	—	" " "	Superphosphate H.G. 18 per cent.	"	—	18.69	19.70	—	19.90	—	—	26.00	—	—
160	—	" " "	Superphosphate H.G. 17 per cent.	Joseph Sacks, Bredasdorp	—	17.30	18.50	—	18.60	—	—	24.30	—	—
161	—	" " "	" "	Hout Kop	—	17.20	18.40	—	18.50	—	—	24.25	—	—
162	—	Dyer & Dyer, Ltd., East London	Excelsior Superphosphate H.G. 18 per cent.	Dyer & Dyer	—	18.05	18.30	—	18.54	—	—	26.10	—	—
—	G.12	" "	" "	Excelsior	—	18.78	—	—	19.29	—	—	26.73	—	—
163	—	South African Fertilizers Co., Durban	Safco Superphosphate H.G. 17 per cent.	SAFCO	—	17.0	17.5	—	18.0	—	—	20.0	—	—
164	—	Hudson, Vreede & Co., Mossel Bay	Superphosphate H.G. 17 per cent.	Lighthouse	—	17.05	17.30	—	17.60	—	—	25.90	—	—
165	—	Kaplan Bros., Bot River	" "	Springbok	—	17.27	18.20	—	18.59	—	—	25.00	—	—
—	C.91	"	" "	"	—	16.52	17.69	—	17.98	—	—	24.54	—	—
166	—	Smuts & Koch, Ltd., Malmesbury	" "	Penguin	—	17.49	—	—	—	—	—	38.21	—	—
—	C.86	" "	" "	—	—	17.27	—	—	17.81	—	—	25.53	—	—
167	—	Woodhead, Plant & Co., Capetown	" "	Hout Kop	—	18.09	19.00	—	19.20	—	—	26.10	—	—
168	—	" " "	Superphosphate H.G. 18 per cent.	"	—	18.30	19.40	—	19.60	—	—	26.00	—	—
169	—	" " "	Superphosphate H.G. 17½ per cent.	"	—	17.60	18.70	—	19.60	—	—	25.80	—	—

CLASS IV.—DOUBLE SUPERPHOSPHATES.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present
				Registered 1st January to 30th June, 1911.	%	%	%	%	%	%	%	%		
170	—	South African Fertilizers Co., Durban	Safco Double Superphosphate	SAFCO..............	—	*40.0*	*45.0*	—	*46.0*	—	—	*20.0*	—	—

CLASS V.—DISSOLVED BONES, VITRIOLIZED BONES, ETC.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present
				Registered 1st January to 30th June, 1911.										
171	—	Mackie, Dunn & Co., Port Elizabeth	Vitriolized Bones...........	Globe................	—	*5.49*	—	—	*14.65*	*2.47*	—	*17.34*	O.	—
172	—	Dunn & Co., East London.........	" "	"	—	*5.49*	—	—	*5.49*	*2.47*	—	*17.34*	O.	—
173	—	South African Fertilizers Co., Durban	Safco Pure Dissolved Bones	SAFCO................	—	*5.5*	*10.0*	—	*15.0*	*2.5*	—	*18.0*	B.	—

CLASS VI.—STEAMED BONES, BONE ASH, ETC.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present
174	—	White, Ryan & Son, Capetown.....	Double Phosphate..........	Os Kop..............	—	—	*4.13*	—	*30.0*	—	—	*40.0*	—	—
—	C.40	" "	"	"	—	—	6.84	—	34.69	.16	—	44.68	—	—
175	—	South African Fertilizers Co., Durban	Safco Steamed Bone Flour..	SAFCO..............	—	—	*10.0*	—	*28.0*	*1.0*	—	*35.0*	B.	—

CLASS VII.—BONE MEAL, BONE DUST, ETC.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble.	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present
				Registered 1st January to 30th June, 1911.										
176	—	South African Whaling Co., Ltd., Saldanha Bay	Whale Bone Fertilizer......	Union..............	—	*.10*	*12.28*	—	*26.06*	*2.45*	—	*37.69*	B.	—
177	—	Stewart & Co., Paarl.............	Bone Meal................	Force..............	—	—	*5.69*	—	*22.0*	*3.4*	—	*28.0*	O.	—
178	—	Malcomess & Co., Ltd., East London	" "	Malcomess B.M........	—	—	*21.90*	—	*22.06*	*4.18*	—	*28.12*	O.	—
—	G.20	" " "	" "	"	—	—	15.91	—	22.44	3.92	—	22.27	—	—
179	—	South African Fertilizers Co., Durban	Safco Finest Bone Dust.....	SAFCO........	—	—	*8.0*	—	*23.0*	*3.75*	—	*28.0*	B.	—
180	—	" " "	Safco Bone Dust...........	"	—	—	*8.0*	—	*23.0*	*3.75*	—	*28.0*	B.	—
181	—	C. Starke & Co., Ltd., Mowbray....	Pure Bone Meal...........	Kudu................	—	—	*13.0*	—	*21.0*	*3.4*	—	*28.0*	B.	—

CLASS VIII.—DISSOLVED GUANOS, ETC.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st July to 31st December, 1910.	%	%	%	%	%	%	%	%		
182	—	Woodhead, Plant & Co., Capetown	Dissolved Peruvian Guano	Ohlendorff	—	*8.24*	*10.07*	—	*10.07*	*4.94*	*2.00*	*10.00*	O. & A.	S.
—	C.37	" " "	" "	"	—	8.74	—	—	—	5.48	2.51	16.31	—	—

CLASS IX.—BLOOD FERTILIZERS.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.										
183	—	South African Fertilizers Co., Durban	Safco Dried Blood Meal	SAFCO	—	—	—	—	—	*11.0*	—	—	Bl.	—

CLASS X.—KAINIT.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.										
184	—	C. Starke & Co., Ltd., Mowbray	Kainit	Kudu	—	—	—	—	—	—	*9.60*	—	—	Potash Salts.
185	—	South African Fertilizers Co., Durban	Safco Kainit	SAFCO	—	—	—	—	—	—	*12.0*	—	—	"

CLASS XI.—POTASH SALTS.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Water soluble.	Citrate soluble	Citric Acid soluble.	Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st July to 31st December, 1910.										
186	—	White, Ryan & Son, Capetown	Sulphate of Potash	Os Kop	—	—	—	—	—	—	*48.0*	—	—	S.
—	C.36	" " "	" "	"	—	—	—	—	—	—	51.17	—	—	—
187	—	R. Wilson, Son & Co., Capetown	Odam's Sulphate of Potash	Phoenix	—	—	—	—	—	—	*40.0*	—	—	S.
—	C.26	" " "	" "	"	—	—	—	—	—	—	52.60	—	—	—
188	—	Devine & Co., Paarl	Sulphate of Potash	Paarl Klip	—	—	—	—	—	—	*40.0*	—	—	S.
—	C.26	" "	" "	"	—	—	—	—	—	—	45.88	—	—	—
189	—	Woodhead, Plant & Co., Capetown	" "	Hout Kop	—	—	—	—	—	—	*48.8*	—	—	S.
—	C.61	" " "	" "	"	—	—	—	—	—	—	50.01	—	—	—
190	—	" " "	Muriate of Potash	"	—	—	—	—	—	—	*50.00*	—	—	Cl.
—	C.54	" " "	" "	"	—	—	—	—	—	—	49.91	—	—	—

CLASS XI.—POTASH SALTS—(continued).

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.	%	%	%	%	%	%	%	%		
191	—	C. Starke & Co., Ltd., Mowbray....	Muriate of Potash..........	Kudu..................	—	—	—	—	—	—	51.0	—	—	Potash Salts.
192	—	" " "	Sulphate of Potash........	"	—	—	—	—	—	—	48.00	—	—	"
193	—	F. B. Morice & Co., Capetown.....	" "	Morice..............	—	—	—	—	—	—	56.0	—	—	"
194	—	Woodhead, Plant & Co., Capetown	Muriate of Potash..........	Hout Kop..............	—	—	—	—	—	—	50.62	—	—	Cl.
—	C.60	" " "	" "	"	—	—	—	—	—	—	51.94	—	—	"
195	—	South African Fertilizers Co., Durban	Safco Nitrate of Potash.....	SAFCO..............	—	—	—	—	—	13.0	44.0	—	N.	N.
196	—	" " "	Safco Sulphate of Potash...	"	—	—	—	—	—	—	59.0	—	—	S.
197	—	" " "	Safco Muriate of Potash....	"	—	—	—	—	—	—	60.0	—	—	Cl.
198	—	Woodhead, Plant & Co., Capetown	Sulphate of Potash.........	Hout Kop............	—	—	—	—	—	—	50.0	—	—	S.

CLASS XII.—NITRATE OF SODA.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
199	—	R. Wilson, Son & Co., Capetown...	Odam's Nitrate of Soda.....	Phoenix......	—	—	—	—	—	15.44	—	—	N.	—
—	C.26	" " " ...	" " "	"	—	—	—	—	—	15.4	—	—	—	—
200	—	Devine & Co., Paarl..............	Nitrate of Soda............	Paarl Klip..............	—	—	—	—	—	15.0	—	—	N.	—
—	C.26	" " " ...	" "	"	—	—	—	—	—	15.4	—	—	—	—
201	—	South African Fertilizers Co., Durban	Safco Nitrate of Soda......	SAFCO................	—	—	—	—	—	15.0	—	—	N.	—

CLASS XIII.—SULPHATE OF AMMONIA.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st July to 31st December, 1910.										
202	—	Woodhead, Plant & Co., Capetown	Sulphate of Ammonia.......	Hout Kop.............	—	—	—	—	—	20.40	—	—	A.	—
—	C.34	" " "	" "	"	—	—	—	—	—	20.30	—	—	—	—
				Registered 1st January to 30th June, 1911.										
203	—	C. Starke & Co., Ltd., Mowbray....	" "	Kudu..................	—	—	—	—	—	19.80	—	—	A.	—
204	—	F. R. Morice & Co., Capetown.....	" "	Morice.................	—	—	—	—	—	20.0	—	—	A.	—
205	—	South African Fertilizers Co., Durban	Safco Sulphate of Ammonia.	SAFCO.................	—	—	—	—	—	20.0	—	—	A.	—

CLASS XIV.—MIXED FERTILIZERS.

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present
				Registered 1st July to 31st December, 1910.	%	%	%	%	%	%	%	%		
206	—	Woodhead, Plant & Co., Capetown	Albert's Plant Food	Hout Kop	—	6.35	6.60	—	6.95	14.74	8.62	1.39	A. & N.	N.
207	—	R. Wilson, Son & Co., Capetown	Odam's Special Potato Fertilizer	Phoenix	—	6.42	—	—	7.78	2.7	3.0	9.21	O. & A.	Cl.
208	—	" " "	Odam's Tree Fertilizer	"	—	7.32	—	—	8.71	2.09	4.00	10.30	O. & A.	Cl.
209	—	" " "	Odam's Dissolved Bone Compound	"	—	18.00	—	—	—	.82	—	—	O. & A.	—
210	—	" " "	Odam's Horticultural Fertilizer	"	—	8.24	—	—	—	4.84	1.50	—	O. & A.	Cl.
—	C.37	" " "	" "		—	8.66	—	—	—	4.62	2.12	17.39	—	—
211	—	Chas. Howie & Co., Kimberley	Clay's Fertilizer	Clay's Fertilizer	—	.1	.5	—	7.7	4.43	.21	18.9	O. & A.	S.
—	G.8	" " "	" "	" "	—	—	—	—	8.16	3.99	—	20.71	—	—
—	G.10	" " "	" "	" "	—	—	—	—	8.80	4.53	—	20.52	—	—
212	—	" " "	Thomson's Vine, Plant, and Vegetable Manure	Artificial Mixed Manure	—	5.50	9.00	—	10.09	3.25	5.00	15.0	B. & A.	S. & Cl
213	—	" " "	Standen's Manure	Standen's Manure	—	—	—	—	20.62	6.91	—	27.49	Not stated	—
214	—	Devine & Co., Paarl	Cross Dissolved Bone Compound	Paarl Klip	—	19.0	11.85	—	11.85	2.14	—	—	O.	—
—	C.94	" " "	" "	"	—	9.59	12.89	—	12.89	.90	—	23.78	—	—
—	C.40	" " "	" "	"	—	11.07	—	—	—	1.15	—	21.35	—	—
				Registered 1st January to 30th June, 1911.										
215	—	Malcomess & Co., Ltd., East London	Malcomess "A" Fertilizer	"A"	—	6.40	—	—	—	2.30	7.20	—	O. & A.	S.
—	G.13 17	" " "	" "	"	—	5.92	—	—	7.41	1.96	6.76	—	—	—
216	—	Mackie, Dunn & Co., Port Elizabeth	Complete Fertilizer	Globe	—	8.24	—	—	10.59	3.30	2.00	12.46	O. & A.	Cl.
—	C.80	S. H. Dart, Capetown	Odam's Complete Fertilizer	M.A.K. over K.K.	—	7.98	—	—	12.83	3.48	3.46	22.89	—	—
—	C.93	—		A J.N.	—	7.31	—	—	10.67	3.36	2.01	20.16	—	—
217	—	Mackie, Dunn & Co., Port Elizabeth	Tobacco Fertilizer	Globe	—	8.24	—	—	9.61	2.47	6.00	11.38	O. & A.	S. & Cl
218	—	" " "	Dissolved Bone Compound "A"	"	—	9.16	—	—	12.82	.82	—	15.16	O.	—
219	—	" " "	Dissolved Bone Compound "B"	"	—	8.24	—	—	12.82	1.64	—	15.16	O.	—
220	—	" " "	Special Potato Fertilizer	"	—	6.42	—	—	7.78	3.70	3.00	9.21	O. & A.	Cl.
221	—	Dunn & Co., East London	Dissolved Bone Compound "A"	"	—	9.16	—	—	9.16	.82	—	15.16	O.	—
222	—	" "	Dissolved Bone Compound "B"	"	—	8.24	—	—	8.24	1.64	—	15.16	O.	—
223	—	" "	Potato Fertilizer	"	—	6.42	—	—	6.42	3.70	3.00	9.21	O. & A	Cl.
224	—	" "	Tobacco Fertilizer	"	—	8.24	—	—	8.24	2.47	6.00	11.38	O. & A	S. & Cl.
225	—	" "	Complete Fertilizer	"	—	8.24	—	—	8.24	3.30	2.00	12.46	O. & A	Cl.
—	G.11	" "	" "	"	—	7.60	—	—	11.00	3.57	3.81	19.95	—	—

CLASS XIV.—MIXED FERTILIZERS—(*continued*).

Serial No.	Laboratory Folio No.	Manufacturer, Vendor, or Importer.	Name of Fertilizer.	Brand of Fertilizer.	Fineness.	Phosphoric Oxide. Water soluble.	Phosphoric Oxide. Citrate soluble.	Phosphoric Oxide. Citric Acid soluble.	Phosphoric Oxide. Total.	Nitrogen.	Potash.	Lime.	Form in which Nitrogen is present.	Form in which Potash is present.
				Registered 1st January to 30th June, 1911.	%	%	%	%	%	%	%	%		
226	—	D. E. Hockly & Co., East London	Hockly's Special Fertilizer..	Hockly's Special Fertilizer	—	9.39	10.46	—	11.32	3.46	2.03	18.49	O. & A.	S.
—	G.22				—	8.95	11.23	—	12.28	3.60	3.11	21.33	—	—
227	—	F. B. Morice & Co., Capetown.....	Odam's" Complete" Grain Fertilizer	Morice."	—	8.24	--	---	10.5	3.3	2.0	12.46	O. & A	Cl.
—	C.71	" " "	" "	....	—	7.98	—	--	12.83	3.48	3.46	22.89	—	—
—	C.80	S. H. Dart, Capetown............		F.J.D.	—	8.51	—	--	14.07	3.03	2.45	21.63	—	—
228	—	Smuts & Koch Malmesbury........	De Pass" Cereal Manure....	Cereal Manure..........	—	10.5	11.5	--	13.0	3.3	1.6	22.0	O. & A.	S.
—	C.80	" "	" "	"	—	11.71	12.26	—	12.36	3.27	2.01	23.41	—	—
229	—	The Chemical Union, Ltd., Durban.	Fison's Special Cane Fertilizer	Fison's...............	—	3.41	5.30	—	7.95	1.26	.74	9.43	O. & A.	S.
230	—	" " "	Fison's Special Mealie Fertilizer	"	—	3.78	5.26	—	7.82	1.13	.56	9.27	"	"
231	—	" " "	Fison's Special Root Fertilizer	"	—	3.73	5.55	—	9.19	.50	.42	10.89	"	"
232	—	" " "	Fison's Special Tobacco Fertilizer	"	—	3.49	4.13	—	5.95	1.38	.65	7.06	"	"
233	—	" " "	Fison's Special Tea Fertilizer	"	—	3.10	5.95	—	8.28	1.18	.79	9.81	"	"
234	—	" " "	Fison's Special Cotton Fertilizer	"	—	3.68	5.17	—	7.18	1.07	.52	8.51	"	"
235	—	" " "	Fison's Special Wheat Fertilizer	"	—	3.75	5.36	—	7.62	1.11	.54	9.03	"	"
236	—	" " "	Fison's Special Potato Fertilizer	"	—	3.43	6.17	—	8.00	1.18	.77	9.48	O. & A.	S.
237	—	South African Fertilizers Co., Durban	Safco Dissolved Bone Compound	SAFCO...............	—	11.0	13.0	—	16.0	1.5	—	18.0	B. & O.	—
238	—	" " "	Safco Potassic Maize Fertilizer	"	—	9.0	10.0	—	12.0	2.5	1.5	15.0	O. & A.	Potash Salts.
239	—	" " "	Safco Maize Fertilizer.......	"	—	9.0	10.0	—	12.0	4.0	—	15.0	"	—
240	—	" " "	Safco Double Complete Fertilizer	"	—	18.0	21.0	—	24.0	8.0	10.0	15.0	A. & N.	N. & S.
241	—	" " "	Safco Vine Fertilizer........	"	—	8.0	9.0	—	12.0	3.0	6.0	15.0	O. & A.	Potash Salts.
242	—	" " "	Safco Garden Fertilizer.....	"	—	6.0	9.0	—	12.0	5.0	6.0	12.0	O., A., & N.	N. & S.
243	—	" " "	Safco Lucerne Fertilizer.....	"	—	11.0	11.5	—	13.0	1.0	6.0	15.0	O.	Potash Salts.
244	—	" " "	Safco Tobacco Fertilizer.....	"	—	9.0	10.0	—	12.0	3.0	11.0	15.0	N.	N.
245	—	" " "	Safco Root Fertilizer.......	"	—	9.0	10.0	—	11.0	2.0	1.5	15.0	O. & A.	Potash Salts.
246	—	" " "	Safco Potato Fertilizer.....	"	—	8.5	9.0	—	12.0	4.0	3.0	15.0	"	S.
247	—	" " "	Safco Grain Fertilizer.......	"	—	10.0	11.0	—	12.0	5.0	1.5	15.0	"	Potash Salts.
248	—	J. W. Whitehead & Co., Port Elizabeth	Odam's Complete Fertilizer..	J.W. in W...	—	7.84	—	—	10.13	3.30	2.0	12.46	"	S.
249	—	White, Ryan & Son, Capetown ...	Vine and Orchard Fertilizer	Os Kop.	—	—	7.0	—	10.0	2.50	3.50	17.0	B. & N.	"

It may be recollected by those who saw the list of registered fertilizers printed in the *Cape Agricultural Journal* of October, 1910, that an exceedingly large proportion of the superphosphates—39 out of 83—were there indicated as below grade in respect of the water-soluble phosphoric oxide contained. As this was stated to be due to unavoidable reversion, in almost every case it was decided that, provided the discrepancy be found not greater than 2.5 per cent., it would in future be held that such discrepancy is sufficiently compensated for by an increase in reverted phosphoric oxide, and that any superphosphates showing such compensation would not henceforth be regarded as below grade. And so it comes about that in the present list, out of eighty-eight superphosphates analysed, only four are shown as below grade in respect of their water-soluble phosphoric oxide. But it will be interesting to inquire what the figures would have been this year, supposing the principle of allowing for compensation not to have been applied. The figures for the previous and for the present year are placed side by side:—

	Per cent.	1909 10.	1910 11.
Below guarantee from ...	.5 to .75	9	12
,, ,, ,,	.75 to 1.0	7	8
,, ,, ,,	1.0 to 1.5	6	12
,, ,, ,,	1.5 to 2.0	10	2
,, ,, ,,	2.0 to 3.0	4	1
,, ,, ,,	3.0 to 4.0	3	0
		39	35

This shows that, quite apart from the matter of compensation, the proportion of samples containing appreciably less than the guaranteed amount of water-soluble phosphoric oxide has diminished, and of those that are thus below by far the greater number show very much smaller discrepancies than last year's list revealed. We may more strikingly summarize these discrepancies thus:—

	Per cent.	1909 10.	1910 11.
Below guarantee from ...	.5 to 1.5	22	32
,, ,, ,,	1.5 to 4.0	17	3
		39	35

This is one of the benefits to farmers resulting from the operation of the Act—an improvement in the quality of superphosphates on sale. Another is seen in the raising of the grades of superphosphates registered. Witness the following table showing the numbers of each grade registered:—

	1909 10.	1910 11.
Under strength	0	1
Low grade	19	12
Medium grade	14	3
Medium high grade ...	31	32
High grade	39	79
	103	127

In other words, during the previous year 32 per cent. of the superphosphates were no better than medium grade and 68 per cent. belonged to the higher grades, whereas during the year now under consideration only about 12½ per cent. of the superphosphates registered were of the lower and 87½ per cent. of the higher grades.

The beneficial effects of the Act have been so clear all round, and the disposition of all merchants to fall into line with its requirements have been so marked that one cannot be otherwise than highly gratified at the progress made. Yet there are possibilities of greater progress. Some of these are dependent upon a greater efficiency of the departmental machinery for carrying out operations demanded by the Act; others depend upon merchants giving heed to some points which have perhaps not been explained with sufficient clearness in the past.

To begin with, a word on the first of these two subjects. It must be apparent to any one who has consulted the successive lists of fertilizers registered and analysed that, nothwithstanding the statutory obligation on the department to take for analysis once at least in every year a sample of *each fertilizer registered*, this is not being done. The simple fact is, the machinery is lacking. And so we find that numbers of fertilizers pass through year after year with no other check upon their guaranteed figures than the mere *possibility* that at any time a sample may be taken for analysis. This applies primarily to fertilizers actually stored for sale within the Cape Province, but it also applies to many fertilizers prepared in or imported into other Provinces of the Union (which have no fertilizers law of their own) and thence sold to Cape Province farmers. It is most difficult for the department under present conditions to exercise an effective supervision over these, and barely anything can be done—pending the more thorough organization of the laboratories—than to hope that ere long the extension of the Fertilizers Act to the Provinces which now lack such a measure will close up what is now an undoubted gap in the effectiveness of our fertilizer legislation. In the meantime in has not been possible during any of the last three years to take samples of the fertilizers referred to for check analysis.

And now, in more detail, a few words to the merchants. They have shown themselves so amenable to the requirements of the Act that the only further preliminary needed is to ask them carefully to study the few points to which their attention is asked below. They would do well, moreover, closely to scrutinize the various details given in the foregoing tables. They are very instructive to those who do not quite know how to fill in the registration forms. Cases have often occurred where merchants have filled in such a form to the best of their ability in one year, but faultily for all that. Their mistakes have been pointed out, the errors rectified, and in due course the fertilizer has been registered. But in the following year they have come forward, as the law demands, to register afresh the same fertilizer, and the registration form contains precisely all the old faults as though they had never been pointed out. This should not be; and a study of the tables now placed before readers should help greatly in obviating this for the future. Nevertheless, let me supplement what they may gather for themselves by a few detailed instructions regarding points that do not seem to have been sufficiently grasped as yet.

Last year I remarked on the absolute need of employing on bags or invoices the actual brand which is specially registered, with the object of identifying any particular fertilizer or group of fertilizers. In many cases when a fertilizer is sampled it is found that the brand is either omitted altogether or else another brand is substituted, and so the clear connection which should exist between the article registered, the article analysed, the firm who registered the former, and the vendors of the latter, fails to be established. Instances where this connection was not clear and open will be found on comparing the registered brands with what was traced of the article afterwards taken for analysis in respect of the following serial numbers in the foregoing tables:—Nos. 20, 21, 41, 44, 60, 63, 79, 80, 100, and 162. When a brand has once been registered it must be adhered to throughout. It should never be omitted, nor should a new and unauthorized brand at any time be introduced.

On the general subject of brands it may also be pointed out that a brand, to fulfil its purpose of establishing clear connection between article and firm, should be of so distinct a nature as to place this connection beyond reasonable doubt. Hence brands in such general terms as "artificial mixed manure" (see No. 212) and "cereal manure" (see No. 228) are inadmissible. Such a brand cannot be the exclusive property of any particular firm, since it is within the right of any one to manufacture and sell a cereal manure and to call it by that name.

In the case of No. 61, not only is the brand of the article analysed different from the only brand registered on behalf of the firm concerned, but the bag containing the fertilizer was marked differently from the manner registered with the department. Whereas the article had been registered to contain at least 16½ per cent. of water-soluble phosphoric oxide, it was sold as containing 16½ to 17½ per cent. As a matter of fact analysis proved it to contain practically 17 per cent. If a merchant finds his registered percentages too low the proper course is to effect a fresh registration on the higher basis, but not to vary in any detail from the amount as set forth in the registration certificate. Moreover, under no circumstances will the department accept a range covering a minimum and a maximum percentage limit for registration. These remarks apply also to Serial No. 151. In the latter case, however, the percentages were not raised, but actually lowered. Other instances are No. 90 (which should be compared with Laboratory folio No. C.77) and No. 142, comparing with the latter Laboratory folio No. C.68.

Serial No. 215 also exhibited, when a sample thereof subsequently came to be analysed, a form of what has just been objected to, namely, in the invoiced percentage of potash a minimum and a maximum figure was stated. Another objection, moreover, had to be raised in this particular instance. When a sample (Laboratory folio No. G.13/17) of the article registered came to be taken for analysis the invoice figures were quite distinct from those registered, as the following comparison will show:—

	Register.	Invoice.
Phosphoric oxide	6.40	6.0 to 7.0
Nitrogen	2.30	2.0
Potash	7.20	7.0

The analysis resulted in figures not appreciably differing from either register or invoice, but the necessity remains—required as it is by Regulation No. 15—that the registration and the invoice figures must be identical in all respects. If a slight deviation be permitted in one case it may form a precedent for a wide deviation in another. Another instance of this occurs in connection with Serial No. 145, where the percentage of water-soluble phosphoric oxide registered was 17.52, but an invoice number of 17.19—already an appreciable difference—was received when a sample was afterwards taken for analysis, and the analysis resulted in a percentage of 16.27 being found. Two subsequent analyses of the article registered gave respectively 16.30 and 16.56. Allowing for the possibilities of reversion, there was no objection to these lower percentages, but the slight divergence illustrated in the preceding case is greater in this one.

There is another matter of general application to all fertilizers alike which calls for comment here. Occasionally a firm, after having registered a particular fertilizer of definite composition under a definite name and brand, applies to register a fertilizer of different composition under the same name and brand. This is a practice that should be avoided as far as possible. It leads to constant confusion in the laboratories, and may also result in confusion to agriculturists, and perhaps even in needless litigation. An instance will better explain the point involved—for example, Serial Nos. 61 and 62. In these cases the vendor, address, and brand were identical, so too were the name, grade, and grade percentage of the two articles, but they differed in the chemical composition—differed, in fact, so considerably that, if the better quality of the two had alone been registered, the sale of the other would have constituted a clear contravention of the law. The objection above referred to of registering a maximum and a minimum limit for the active constituents of a fertilizer holds even more strongly against this, which is virtually equivalent to registering one fertilizer with a lower and higher grade of composition. Supposing that in such a case a sample of No. 61 were analysed and found to be below grade for that number, but within the limits for No. 62, the argument may be brought forward that it did not claim to represent the former number at all, but the latter; or it may be said that the invoice would disclose which of the two was intended. This sounds plausible enough, but it does not operate satisfactorily in actual practice. It does not operate practicably when articles are submitted for analysis through the Customs; and, furthermore, the chief and readiest means of identification of a fertilizer should be those which strike the eye soonest—the firm, name, grade, and brand—and to make identity in all these respects to be virtually set aside by the invoice would be almost analogous to the sale of an article bearing on its label in large letters the words

"PUREST CONDENSED MILK"

and below, in small type,

"deprived of its fat".

In a case like this all objections will be met if before the word "superphosphate" "A quality" were prefixed in the case of No. 61 and "B quality" in that of No. 62. I do not say that this would meet every

case, but it would go far to do so, and the department will always be ready, by verbal discussion, to meet difficulties and if possible to suggest solutions, provided that merchants on their part will recognize the department's objections to the practice just alluded to and as far as it can be done avoid registering fertilizers identical with each other in every respect—except, it may be, a shade of difference in their chemical composition. The points here alluded to may be more fully understood by carefully comparing No. 26 with No. 28, No. 69 with No. 70, No. 81 with No. 82, No. 97 with No. 132, No. 109 with No. 110, and No. 142 with No. 143.

Comparison may also be made between the total phosphoric oxide shown in Nos. 218, 219, and 220 with the percentages registered for Nos. 221, 222, and 223.

I have been asked to state definitely, for the information of merchants, what items they should register, and for the information of farmers what items they should look for in the case of each fertilizer. This is best stated categorically:—

Guanos.—Water soluble, citrate soluble, and total phosphoric oxide, nitrogen, potash, and lime.

Basic slag.—Fineness, citric acid soluble and total phosphoric oxide, and lime.

Superphosphates.—Water soluble, citrate soluble, and total phosphoric oxide and lime.

Dissolved or vitriolized bones.—Water soluble, citrate soluble and total phosphoric oxide, nitrogen, and lime.

Steamed bones, bone-ash etc.—Citrate soluble and total phosphoric oxide, nitrogen, and lime.

Bone meal, bone dust, etc.—Fineness, citrate soluble and total phosphoric oxide, nitrogen, and lime.

Dissolved guanos.—As for untreated guanos.

Blood fertilizers.—Nitrogen.

Kainit.—Potash.

Potash salts.—Potash and (in the case of nitrate of potash) nitrogen.

Nitrate of soda.—Nitrogen.

Sulphate of ammonia.—Nitrogen.

Mixed fertilizers.—As for guanos.

Merchants would be acting discreetly, and save the department trouble (as well as themselves trouble and expense), by pointing out clearly to their European correspondents what items should be stated in their certificates of analyses and how these items should be stated.

It may be mentioned in conclusion that in consequence of the recent introduction of low grade basic slag it has been decided to prohibit the sale or importation under that name, or under the names of Thomas phosphate or Thomas slag, any slag containing less than 12 per cent. of phosphoric oxide soluble in a 2 per cent. solution of citric acid. Henceforth, therefore, the sale of such fertilizers as Nos. 13 or 25, under any of these names, will not be permitted, and merchants are advised to bring this intention to the notice of their correspondents in Europe.

The Forest Red-gum

(*Eucalyptus tereticornis* Sm.).

By Joseph Burtt-Davy, F.L.S., Government Botanist.

(See Plates.)

Owing to the frequence with which specimens of Eucalyptus are sent to the Division of Botany for identification, it is proposed to illustrate some of the more important of them in the pages of the *Journal* for the guidance of farmers.

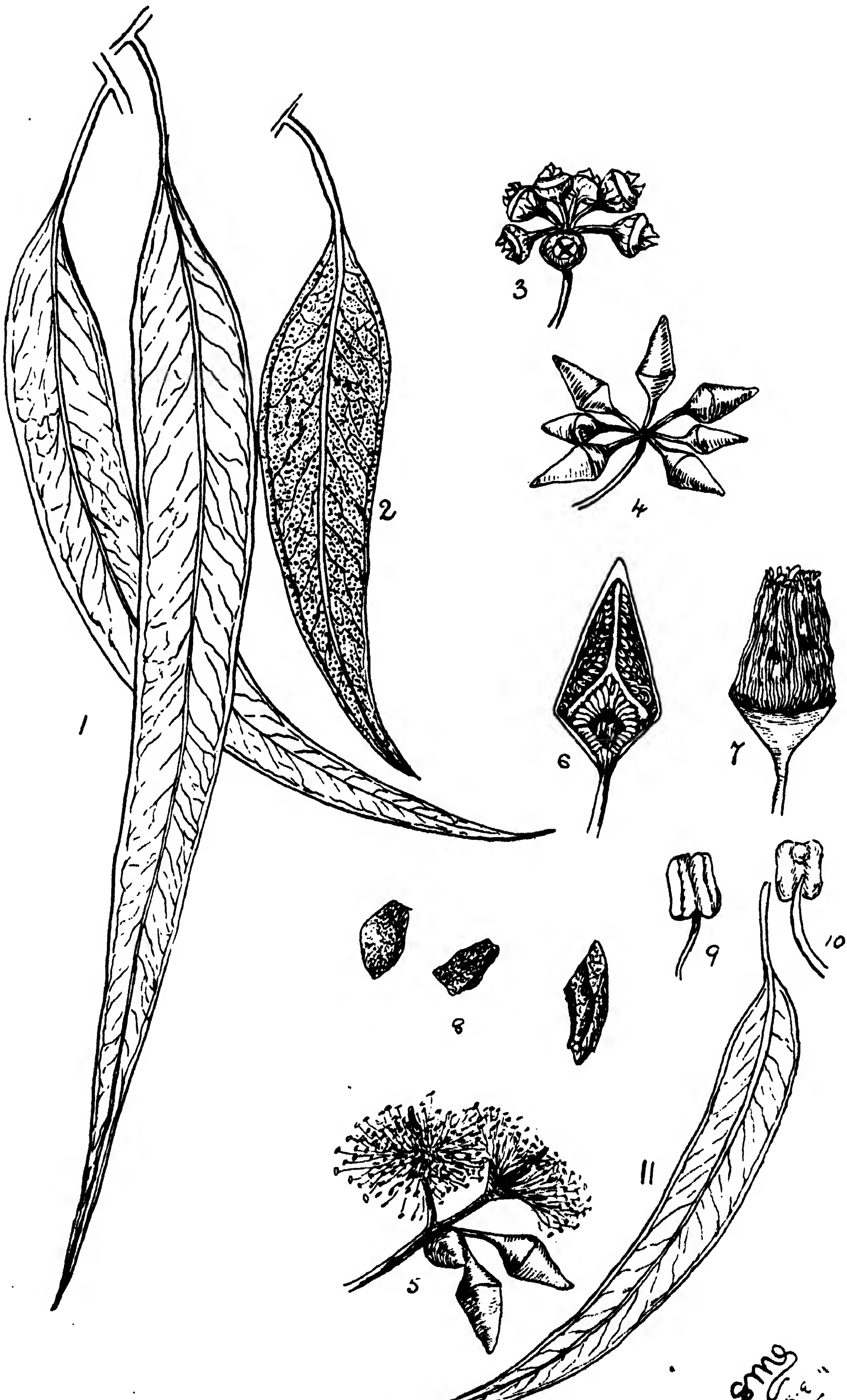
Professor J. H. Maiden, F.L.S., Government Botanist, New South Wales, gives the following information about the Forest Red-gum, which is extracted from his "Forest Flora of New South Wales".

Tall tree up to 100-120 feet high with a diameter of 3 or 4 feet; bark smooth, whitish, or ash-coloured, shedding in thin layers. *Leaves* lanceolate, mostly falcate and acuminate, often exceeding 6 inches long, the veins rather regular and numerous, and oblique as in *E. rostrata,* but often rather coarser, the intramarginal one rather distant from the edge. *Peduncles* axillary or lateral, not very short, terete or angular, the upper ones sometimes forming a short panicle, each bearing about four to eight flowers on pedicels of one to three lines. *Calyx-tube* turbinate, two to nearly three lines diameter. *Operculum* conical acuminate, usually about ½ inch long, always much longer than the calyx-tube and usually broader, of a rather thin texture and smooth. *Stamens* often ½ inch long, more or less inflected in the bud, but sometimes only very shortly so at the ends; anthers small, ovate, with parallel distinct cells. *Ovary* nearly as long as the calyx-tube, and convex or conical in the centre. *Fruit* obovoid or almost globular, three to four lines diameter, the rim broad and very prominent, the capsule not sunk, the valves protruding beyond the rim.

The name *tereticornis* refers to the shape of the operculum (lid of the calyx), from Latin *teres, teretis,* long and round, taper as a tree or pillar; *cornu,* a horn.

Uses.—The timber is described by Mr. Maiden as "of a deep red colour, hard and inlocked in the grain, heavy and durable. Apt to warp in seasoning, and, in common with many of its congeners, it is very hard to work up when dry. It has some tendency to shell off, which limits its use for such purposes as flooring and decking. It is much esteemed for fence-posts and any underground work, its great durability for this purpose having been long established. Used also for naves and felloes of wheels, and for general building purposes. Its merits and defects are much the same as those of Murray Red-gum, and I draw attention to it as a meritorious timber for wood-blocks. It is a valuable timber for railway sleepers." The oil is said to be of no commercial value.

Eucalyptus tereticornis **Smith.**



Eucalyptus tereticornis Smith.

Varieties.—Eucalyptus tereticornis is one of the most variable of Eucalypts; the following varieties are described:—

1. Var. *dealbata* Deane and Maiden.
2. Var. *latifolia* Benth.
3. Var *squamosa* Maiden.
4. Var. *Bancrofti* Maiden.

Miss Stent's drawing is from a specimen growing in Arcadia, Pretoria, which began to flower in August 1911. The details of the illustration are explained as follows:—

1. Leaves, natural size.
2. Leaf showing oil-dots (visible when the leaf is held up to the light).
3. Fruit, natural size.
4. Buds, natural size.
5. Flowers, natural size.
6. Longitudinal section through bud, showing arrangement of anthers and seeds (enlarged).
7. Bud with calyptra removed (enlarged).
8. Seeds (enlarged).
9. Anther, front view (enlarged).
10. Anther, back view, showing round gland between the locules at top (enlarged).

Inquiries about Eucalypts and other trees should be addressed to the Department of Forestry.

Some Colics of the Horse: Causes, Symptoms, and Treatment.

By C. H. Wadlow, Government Veterinary Surgeon, Ladybrand (Orange Free State).

Colic in General—Enteralgia.

Definition.—A morbid or unhealthy condition of the stomach and intestines, generally giving rise to suppression of intestinal movement and accompanied by pain. There are recognized two classes of colic, viz., true colic (pain in the stomach and intestines) and false colic (colic arising from disease of the kidneys, liver, bladder, sexual and other abdominal organs).

History.—It is one of the oldest known diseases, having been written of as far back as the 4th and 5th centuries.

Etiology or Predisposing Causes of Colic.—The horse is more predisposed to this disease than any other animal on account of the anatomical formation of his stomach and intestines. Owing to the peculiar construction of the former the act of vomiting (except on very rare occasions) is prevented, and thus neither solids, liquids, or gases can be discharged through the mouth. Other predisposing causes consist in the highly sensitive nature of the intestinal nerves; also hereditary predisposition undoubtedly plays some part.

Some General Causes.—The causes of colic are, as can well be imagined, various and numerous, but the following are probably the most common:—Overfeeding, especially when the food is difficult to digest, such as new forage, new oats, new maize, peas, potatoes, beans, and rye; by feeding on mouldy, fermented, and spoiled foods; sudden changes in diet, such as from veld to stable food; working too soon after feeding and not allowing sufficient time for digestion; chills caused by consuming large quantities of cold water when in a heated condition; accumulation of gases in the stomach and intestines, due to eating in excess green barley or lucerne (these being succulent and very easily swallowed without being properly masticated); drinking water too soon after feeding; accumulation of food in the intestines, generally due to long, continuous feeding on dry innutritious food, such as straw; not receiving sufficient exercise; or from paralysis of the intestines.

Other causes, but less common, are:—Intestinal worms (*Ascaris megalocephala*), generally found in the small intestines and a frequent cause of chronic diarrhœa in young horses; accumulation of sand in the intestinal canal, not uncommon in military horses whilst on manœuvres; twisted bowel and invagination of the bowel; too long fasting, known as "hunger colic"; and various diseases of the intestinal tissues.

General Symptoms of Colic.—By far the most general symptom of colic is abdominal pain, which as a rule commences suddenly.

Should the horse be in harness he will be noticed to be "off colour", commence to lag, go short in his stride, appear weak in his hind quarters, take little if any notice of the whip, and make frequent attempts to stop. If continued to be driven he will rapidly become worse—stops and refuses to move, appears very uneasy, sweats profusely, paws the ground, crouches and attempts to lie down. If taken out of harness and placed in a stable he will, if allowed, probably lie down (if in great pain he throws himself down recklessly), rolls on his back, gives an occasional struggle, jumps up, shakes himself, appears free from pain, and may even commence eating. The interval of ease is, however, of very short duration. The pain reappears, sweats break out over the body (especially at the base of the ears, the belly, and flanks), the extremities become cold, mouth hot and dry, mucous membranes injected, breathing accelerated and often laboured and difficult; the temperature, generally normal at the beginning of an attack, may rise many degrees, and the pulse increases to 70 or 80 beats a minute, or commonly more. If an examination of the rectum be made with the hand it will be found to be very hot and dry, the mucous membrane swollen, and it may or may not contain fæces. If the hand be further introduced the intestines may be found tense and firm to the touch and filled with gas; the bladder is generally distended, and attempts at making water (*micturition*) only results in the passage of a few highly coloured drops of urine.

Should no relief be given, the horse now rapidly becomes much worse, and in many cases assumes some extraordinary positions—such as sitting on its haunches like a dog, or else kneeling with his hind quarters raised. In other cases, where the pain is very acute, he may become so agonized that he will throw himself about the box without the slightest regard to danger. Suddenly all sign of pain may disappear; instead of being so uneasy he will now stand with his head depressed in the corner of the box semi-conscious, trembling, and bathed in cold perspiration.

If one examines the heart it will be found tumultuous, the pulse increased, thready, and with difficulty felt; the expression on the face becomes very haggard, pupils dilated, eyes glassy; finally the animal staggers, falls, gives a few convulsive kicks, and dies.

Prognosis (or probable result of an attack).—In very many cases this is favourable. The pain becomes less acute and intervals of ease prolonged. There is an inclination to eat, the pulse and temperature become normal (or almost so), mucous membranes assume a healthy colour, bowels commence to move; there is passage of fæces and wind, the animal ceases to perspire, and assumes a natural expression about the face. The unfavourable signs are those indicating the approach of gastro-enteritis (inflammation of stomach and intestines), or some such complaint equally as serious. The temperature either becomes very high or else falls below normal, the pulse frequent, thready, and it is with great difficulty that it can be recognized at all; the pain becomes more acute and is incessant, there is difficulty in breathing, sweats break out over the body, the abdomen becomes distended, and the facial expression extremely haggard.

In cases when attacks end fatally death generally results from one of the following causes:

1. Acte inflammation of the bowels; probably the most common cause.

2. Suffocation or apoplexy. The intestines being greatly distended with gases cause pressure on the lungs, thus interfering with respiration and giving rise to suffocation, or the distended bowels interfere with circulation by pressing on the larger blood-vessels giving rise to apoplexy.

3. Blood poisoning. The excessive amount of gases (chiefly carbonic acid) formed in the bowels become absorbed into the circulation, causing blood poisoning.

GENERAL TREATMENT OF COLIC.

Try and find out first of all the cause of the attack, remove it, and if possible prevent its recurrence in future.

The difficulty in treating cases of colic in country districts is the restricted number of drugs at one's disposal, therefore it will be best to mention here only those that are generally at hand or else easily obtainable.

Look upon all cases as if serious at first so that nothing may be neglected that would be likely to lead to a favourable termination.

The first thing to do then is to place the horse in a nice, comfortable loose-box with plenty of bedding, so that should the pain become very acute he is less liable to injury should he throw himself down, and if the weather be cold he must be rugged and his legs bandaged. Next make an examination per rectum, removing any fæces or excrement by means of the hand. An enema (injection) consisting of 2 to 4 quarts of warm soapy water, to which has been added 2 ounces of either glycerine or linseed oil, should now be given and retained for five minutes or so by keeping the tail depressed by means of the hand. The injection should be repeated every half-hour if necessary, and the abdomen should be well rubbed with some stimulating liniment, such as soap liniment or ordinary embrocation.

A good drench to administer, and one easily obtainable, is 1 ounce of oil of turpentine well shaken up in a pint to a pint and a half of raw linseed oil. This should be given slowly, and if there is the least inclination to cough on the part of the patient the head should be lowered at once. This drench if necessary can be repeated in an hour's time, and will be found generally beneficial in most attacks of colic. Other drugs that can be given with the hope of proving successful consists of aloes, 4 to 8 drams, in the form of a ball; epsom salts, 8 to 10 ounces, in a pint of chilled water; calomel, 1 dram, generally combined with 4 drams or so of aloes; carbonate of ammonia, 1 to 2 drams, in a ball or combined with nux-vomica, 1 to 2 drams, etc.

If the animal appears to be suffering considerable pain, which is often the case in attacks of *spasmodic* or *cramp colic*, the best means of relieving it is to give an injection of morphia. The drug is put up in tabloid form, each containing 1 grain. Dissolve one to three tabloids (according to age and size of animal) in a teaspoonful of hot water, let it cool, and then inject it by means of a syringe under the skin—the skin immediately behind the elbow is as good a place as any, as it is here loose and soft. Should there be any difficulty in obtaining the morphia a drench consisting of 1 ounce of chloral hydrate, or 1 dram of extract belladonna, dissolved in a pint of chilled water, will in many instances be found to give relief. Another

drench frequently used and well spoken of consists of 1 to 2 ounces laudanum (*tinct. opii*), 2 ounces spirits nitrous ether, and ½ ounce aromatic spirits of ammonia, which may be given dissolved in a bottleful of gruel or linseed oil. In the more serious cases where drugs administered by the mouth may have no effect it will be advisable to try an injection such as eserine sulphate, 1½ grains. This may be given by itself or, better still, combined with pilocarpine nitrate, 2 grains. These, given dissolved in a little water and injected under the skin, are as a rule very prompt in their actions, causing movement of the bowels generally in from twenty to thirty minutes. They are of course only indicated in cases where there is a complete absence of bowel movement and persistent stoppage. They should be used with care, and are best left alone in mares heavy in foal.

In cases of *flatulent* or *wind colic*, when the abdomen is greatly distended with gas, care should be taken not to allow the animal to throw himself down and roll, as by doing so he is apt to rupture the bowel. He should be kept gently moving about, and should the gases tend to increase the bowel must be punctured by means of a trocar and the gases allowed to escape. The operation is known as enterocentesis, and will be fully described under the heading of *Treatment of Flatulent Colic*.

I.—SPASMODIC COLIC,

Commonly called *cramp colic*, is a spasmodic contraction of the muscular walls of the intestines, generally the result of a chill, either external or internal, or to improper feeding (such as feeding on damaged food), or may be brought about by drinking cold water in excess when in a heated condition.

Symptoms.—Attacks as a rule commence somewhat suddenly. There is pain, uneasiness, kicking at the belly, scraping with the forefeet, looking round at the flanks, and repeated attempts at lying down. Eventually the horse goes down (very carefully as a rule), rolls, kicks, or else lies flat on his back with his legs tucked in. In this position he may remain for a minute or so apparently quite free from pain. Suddenly the cramps return, he jumps up, wanders round the box, scrapes with his forefeet, crouches, and repeats the same train of symptoms over again. In these attacks the pain is very acute but of short duration. It appears very suddenly and after disappears just as quickly, and, in contradistinction to many forms of colic, there may be considerable activity of the bowels, or even diarrhœa. These attacks generally pass off in a few hours' time.

Treatment.—Place the horse in a comfortable, roomy loose-box with plenty of clean bedding, and if the weather be cold he should be rugged and bandaged. Give enemas (injection per rectum) of warm soapy water—2 quarts or so—to which add 2 ounces of glycerine or linseed oil. Repeat if necessary every half-hour and well rub the belly with a good stimulating liniment. If the case is a particularly serious one it will be well to give a sedative, such as a hypodermic injection of morphia (2 to 4 grains, as described in general treatment for colic), and foment the abdomen with hot water: but the latter, to be successful, must be continuous and the water kept uniformly hot. After fomenting the abdomen it should be rubbed dry and smeared over with liniment or embrocation.

In ordinary cases some of the following drugs may be tried with success:—Oil of turpentine, 1 to 2 ounces in a pint to a pint and a half of raw linseed oil; tinct. opii (laudanum), 2 ounces; spirits nitrous ether, 2 ounces in half a bottle water or oil, or extract belladonna (1 dram); sulphuric ether, 1 ounce in a pint of chilled water.

The horse should be occasionally led about, and on no account left until all dangerous symptoms have subsided.

II.—FLATULENT COLIC OR WIND COLIC.

Characterized by distension of the abdomen—generally stomach and large intestines—with gases (carbarhetted hydrogen and carbonic acid), commonly due to indigestible food or to the consumption of food tending to produce flatulence or wind, such as green barley and lucerne, hastily consumed. Or it may result from "wind sucking" or overfeeding after a long fast.

Symptoms.—This is the easiest form of colic to diagnose owing to the distended condition of the abdomen, the walls of which become arched like a barrel, are very tense to the touch, and on percussion emit a distinct sound.

There is a dull pain, and as the gases increase the breathing becomes difficult owing to the pressure of the abdominal organs (stomach and intestines) on the lungs impeding respiration, or else due to the absorption of the accumulated gases in the intestines, giving rise to blood poisoning.

Treatment.—The most important thing is to get rid of the gases in the intestines, and this is most speedily brought about by the operation of enterocentesis or puncture of the bowel, which can be done in the following manner:—

The horse should be in the upright position. The most prominent point in the angle formed by the external iliac angle (hip), the posterior edge of the last rib, and the transverse processes of the lumbar vertebrae (back-bone) on the right side, should be well washed with some suitable disinfectant. The selected spot must then be shaved, washed with ether, and painted with tincture of iodine, if at hand (otherwise any of the ordinary disinfectants will answer the purpose). The skin should then be incised for about ¼ inch with a sharp-pointed knife. The trocar and canula—6 to 8 inches in length and ⅛ to $\frac{3}{16}$ in diameter—which has previously been disinfected by boiling for a few minutes (the point), is now inserted into the opening in the skin and thrust through the abdominal walls, slightly inclined downwards and forwards, into the intestine (cæcum) for from 3 to 4 inches. The trocar is then withdrawn and the gases allowed to escape slowly. This can be regulated by holding the finger over the external opening of the canula. The latter may be left in position for some time if necessary by being attached to a tape passed round the abdomen, and should the gases tend to re-form the following solution (carbolic acid ½ ounce, chilled water 20 ounces), if injected through the canula into the intestine, will help to arrest further fermentation. After the escape of the gases the trocar is inserted into the canula and the whole withdrawn.

Should there be no escape of gases on puncturing the right side the operation may be performed without danger on the left flank (same position), or it may be tried a little above or below the original

spot on the right side. This operation is attended with little, if any, danger if careful attention be paid to the thorough disinfection of the seat of puncture and of the instrument used, and it may be repeated half a dozen times or more on the same animal in one attack.

Previous to puncturing the bowel a drench consisting of oil of turpentine, 1 to 2 ounces, linseed oil, 1½ pints, may be given. The animal should also receive an enema (injection per rectum), which should be repeated if necessary.

Particular care must be taken in this form of colic that the horse be not allowed to throw himself down, as by doing so he is apt to rupture the distended bowels.

As I have described the two most common forms of colic met with, in some detail, it will only be necessary to say a word or two about some other forms less frequently occurring.

COLIC DUE TO GASTRIC IMPACTION.

Commonly caused by overloading the stomach after a prolonged fast, or allowing a horse a plentiful supply of green barley or lucerne when not accustomed to it, and which is easily bolted without being properly masticated.

Symptoms.—The animal ceases to feed and appears dull and listless; stands with head depressed and eyes half-closed. The abdomen is distended and there is slight pain and uneasiness. The bowels are constipated, and if an examination per rectum be made it will generally be found filled with dry fæces.

Treatment.—Remove the fæces from the rectum and give an enema (injection)—2 quarts of warm soapy water.

One of the best drugs to use is aloes. Give a ball, consisting of from 4 to 8 drams (according to age and size), see that the horse is kept nicely warm, and give gentle walking exercise.

COLIC DUE TO INTESTINAL IMPACTION.

Brought on by excessive feeding on dry food or suddenly changing from veld to stable food; insufficient exercise; ingestion of large quantities of sand, "sand colic"; diseases of teeth interfering with mastication; and debilitating diseases causing weakened bowel action.

Symptoms.—Dull pain, restlessness, animal either wanders round the box in an aimless manner or else stands with his head depressed and his hind quarters resting against the wall.

He may, however, go down and lie flat on his side for a minute or so, when up he jumps and repeats the same run of symptoms over again. There is constipation, and if the hand is introduced per rectum there is considerable opposition, the animal straining and pressing violently.

Treatment.—Similar to that described for gastric impaction.

Give enemas, remove all accumulated fæces, and either give a 4 to 8 drams aloes physic ball (according to age and size), or else a pint of linseed oil with 1 to 2 ounces of oil of turpentine. Should these have no effect, one may try a ball consisting of ammonia carbonate (2 to 4 drams), nux-vomica (1 to 2 drams), and repeat in half an hour's time if necessary.

In more obstinate forms recourse will have to be had to an injection of eserine sulphate, 1 grain, pilocarpine nitrate, 2 grains—the former of which causes activity in the muscular coat of the bowel and the latter stimulates secretion in the intestinal glands. These salts can be bought put up in tabloid form, and all that is necessary to do is to dissolve one or more (according to age and size of the animal) in a little hot water, let it cool, and inject it by means of a syringe under the skin. This dose if necessary may be repeated in one hour's time, but should not be used on mares heavy in foal.

COLIC DUE TO WORMS.

Occasionally occurs, and is generally due to the excessive number of round worms (*Ascaris megalocephala*) in the intestines. Young horses especially suffer from this complaint, and the symptoms they display are as follows:—

A hide-bound and unthrifty appearance, occasional colicky pains, and slight diarrhœa; in very severe infection there may be either stoppage or perforation of the bowel.

Treatment (for worms).—Fast the animal for at least twelve hours and then give 1 to 2 ounces of turpentine in a pint of raw linseed oil. Santonni, ½ to 1 dram, followed in a few hours' time by a dose of oil, will also be found effectual. Five to eight grains of arsenic, given for six consecutive mornings, is another common remedy.

A very good prevention is to have a lump of rock salt always in the horse's manger.

The forms of colic I have described are those most commonly met with. They are as a rule not very dangerous, and readily yield to reasonable treatment. It will be noticed that I have generally advocated the administering of a drench consisting of turpentine and linseed oil. This is partly for the reason that they are generally to be had on a farm and partly owing to their great value in most cases of bowel trouble. Turpentine is both antiseptic and stimulant, and when given combined with oil forms a very valuable remedy.

In all cases of colic, however mild or otherwise, the cause of the attack if possible should be ascertained and care taken to prevent its recurrence in future.

The Utilization of the Zebra and its Hybrids.

[A Short Report by H. WATKINS-PITCHFORD, Government Bacteriologist (Natal)].

THIS subject has frequently been considered in the past, especially in Natal, but hitherto no adequate or systematic endeavour has been made, under proper conditions, to develop the project or to prove its great potentialities.

The advisability of taking some steps to utilize the great equine asset that we possess in the zebra has frequently been urged upon the late Natal Government. The practically unlimited numbers of zebra available, their ready domestication under proper system, their immunity to disease, and the promise reasonably to be entertained of their hybrids exceeding greatly in value the parent stock, has seemed to render the question in the past one of much economic promise.

Some eight years ago the late Natal Government decided to undertake preliminary observations on the point, and an adequate sum was placed upon the draft estimates of the writer's department. Financial considerations, however, led to the reluctant withdrawal of the item at the last moment, since which time no official steps have been taken beyond one or two preliminary observations made by myself in Zululand, and much correspondence between the late Natal Colonial Secretary's Department and the Agricultural Department, Magistrates, and those interested in the project.

The writer would now respectfully urge upon the consideration of Government the undertaking of such adequate preliminary observations as will suffice to demonstrate the great use which can be made of the zebra and its hybrids as a transport animal, and one which will not only take the place of the mule but will promise to possess an immunity to indigenous diseases, rendering it available for service in all parts of the Union.

The writer is also confident this possibility can be shown without any great difficulty or expense, and that the outcome of such observations will be of far-reaching interest and profit to South Africa.

Objections to any system of zebra domestication are generally based upon the difficulty of securing a sufficient number of animals or the intractability of the zebra when caught. Both these objections may be lightly dismissed. Attempts to capture the zebra by twos or threes by lassoing or riding them down have nearly always proved unsatisfactory, as the Natal records show, while the attempts to drive into enclosures have been generally unsuccessful by reason of the small number of men engaged in driving, etc. Where, however, bomas or catching-kraals are properly constructed and ample native assistance is secured no fear need be apprehended as to success in driving.

The intractable nature of the zebra has often been urged against its utility, but the objection does not bear close investigation. (It is, of course, to the Burchell's zebra not the mountain zebra that the

present remarks are intended to apply.) All the evidence available goes to prove the ease with which recently captured zebra have been rendered amenable generally within a few days of capture (providing this latter has been properly effected).

As regards their reliability to retain their domestication no difficulty exists. Young zebras in Natal have been outspanned and grazed upon the same veld upon which they ran wild shortly before, without any difficulty being experienced in straying, inspanning, etc. In a case reported by a Natal magistrate of a stampede of a troop of wild zebra, together with several recently tamed animals used for decoys, these latter bolted back to their stables while the wild troop went in another direction. Such instances could be multiplied were it necessary to prove that domestication is both easily and permanently effected.

Docility and steadiness in harness with high courage in moving dead weight are claimed for this animal by all possessing an experience of the properly-broken Burchell zebra. The magistracy of Ubombo, Zululand, is situated upon the top of a hill—described by the Public Works authorities of Natal as the steepest grade road in the Province. The magistrate at Ubombo wrote last year (in reply to some query of mine): "They (the zebra span) came up here again the other day, eight of them, and the majority not nearly full grown, with 3000 lb. on the wagon; then again they are so wonderfully amenable", etc. Pace and endurance—on ordinary corn food—great hardihood, and total immunity to tsetse and horse-sickness are also among the good qualities of this undeveloped equine. The only thing requisite is size (the average Burchell zebra is about 14 hands), and on this point the writer is confident—given the care and selection in mating observed in horse-mule production—the outcome would as regards size be all that could be reasonably looked for.

The Burchell zebra crosses readily with other equines, a fact which renders possible the production of a hybrid of almost any desired stamp, and there is no reason why zebra mules produced by appropriate mating should not only rival in size but exceed in other qualities the best horse mules now imported into South Africa.

Difficulties of mating, sometimes experienced by breeders in the past, would not exist under the system of artificial insemination, while the rate of reproduction would be able to be profitably regulated by this means.

The ease with which the zebra breeds in captivity would—under adequate management—provide numbers of animals of approved type suitable for stud purposes, and it is anticipated that after one or two successful drives on an adequate scale the occasion for further captures would be infrequent—at least until the scheme developed large dimensions.

Preliminary observations would be directed to establishing the most successful lines of mating both with the horse and the ass—on both male and female side—and to determining exactly the degree of immunity possessed by such hybrids and whether any lapse of natural immunity occurred in zebra removed from their natural habitat.

Such preliminary experiments—though of essential importance to the ultimate successful working of the scheme on scientific lines—could be carried out at a moderate cost.

The writer would suggest—in the event of the project securing the favourable notice of Government—that such preliminary work be

undertaken in Natal, this Province—by reason of its climatic conditions—being well suited for the purpose. With slight alterations and unimportant additions of a temporary nature, the buildings and paddocks of the laboratory at Pietermaritzburg would be found well adapted to the purposes of this inquiry, and extensive grazing ground could, it is believed, be secured by the courtesy of the Pietermaritzburg Corporation, should the necessity for any such extensions become at any time apparent as a temporary measure.

The above scheme has been put forward in skeleton and with the intent to draw attention to the existence of a latent South African asset which is believed to be of great magnitude. The writer has already in another place sought to bring the scheme to the notice of the Defence authorities, particularly in connection with the establishment of a first line of transport capable of being employed in operations in districts dangerous for horse-sickness or deadly to ordinary equines from the existence of " fly-belts ".

Notes on the Cultivation of the Olive Tree at the Cape.

By EUSTACE PILLANS, Government Horticulturist (Cape).

THE climate and conditions prevailing along the southern littoral border of the Cape are so admirably suited to the growth and cultivation of the olive that one sometimes wonders why the culture of this fruit did not engage the attention of our early settlers here, in the same way as the vine, especially since many of these people came from a country where the olive has been cultivated for profit for ages past. Probably the secret of the long neglect of this source of wealth is to be found in the fact that the tree is of slow growth and demands a little foreknowledge and faith for a few years while it gathers strength enough to commence the term of bearing, which will last beyond the gathering powers of its planters.

Up to such altitudes as do not carry sharp and continued frost, we have suitable localities for olive culture along the coast region of the Cape. It is not to be supposed that this tree is without special peculiarities demanding selection of suitable localities. It will grow in almost any soil that is not waterlogged or a stiff clay. A comparatively open, dry, and friable soil with a mixture of lime in it will grow the olive to perfection. The districts of Worcester, Montagu, and Robertson are eminently suitable.

Like every other cultured object, the olive gives a return proportionate to the intelligent labour it receives. Trenching the uncultivated ground that is to receive the trees is by far the best preparation; the mere digging of holes on the plot is not sufficient. Twenty feet every way is the distance apart the trees should be planted. For the first few years snatch crops may be cultivated, provided the land is manured. As the trees get up these economies must cease and the whole attention given to the main object of culture. The soil must be worked and kept as clean as that of any orchard.

Trees may be raised from cuttings, for few hard-wood trees are so easily propagated as the olive. Cuttings about a foot long and of fairly thick wood do excellently if the ground is friable, well-drained, and capable of irrigation in dry weather. It is best to put the cuttings deeply in the ground, leaving only two eyes exposed. As with all cuttings to be grown these should be taken from the parent trees with a clean, sharp knife without damaging the bark. In the second season after laying down they should be strong and sufficiently well rooted to plant out. Well managed trees should produce fruit in the sixth or seventh year after planting; their productiveness may, however, be materially hastened by judicious pruning. The amount of the yield increases year by year. It is advisable to shelter the stems of the young trees from the hot sun by wrapping grass or such stuff round them; this will save the bark from sun-scald.

The pruning of the olive tree is all important. It will be found that it only produces fruit on wood of the previous year's growth (one-year old wood), hence it is necessary to encourage such growth, and where it is, there to retain it. To attain this it is wise to remove all useless wood when thinning, pruning back the tall vertical branches which the tree is so prone to produce and induce lateral growth, which can always be topped back. So many still have the idea that the cultivated olive tree can care for itself, as the wild tree does, and needs no cultivation or pruning, and can grow where no other fruit tree would live, that the following advice is worth noting:—The olive, like most fruit-bearing sorts of trees, needs a seasonal pruning to shape the tree during its early life and afterwards to cause regular bearing; when this is neglected the result is an irregular yield of fruit and loss of a crop. The low-headed system is recommended to save cost in picking and pruning and in every way for handling the tree. Pruning should be done just after the fruit is harvested, but during the growing period any inordinate growth may be pinched back so as to keep the more vigorous growth in check. The tree really requires as much care and attention as any other fruit tree, and is only a success and bears profitable crops when it receives this. Water is also necessary for its well-being, and where this cannot be provided artificially or the rainfall is small, it should be obtained by conserving the moisture in the soil by constant cultivation to break up the top tilth of the ground and prevent evaporation. Too much water is injurious, in the same way as it is to other fruit trees, hence the advice to plant only on well-drained land, preferably a hill-slope where there is good soil.

Trees of the following varieties have been imported by the Government of late and are now planted out for the purpose of providing cuttings for issue to growers as soon as their growth permits of it: Mission, Nevadillo Blanco, Manzanillo, Picholon, Queen, and Obliza.

Pernicious Scale.

DESTRUCTION OF INFESTED AND SUSPECTED TREES.

The public is informed that the Government is attempting the eradication of the Pernicious Scale (*Aspidiotus perniciosus*), the fruit tree pest that was recently discovered in a Pretoria nursery, and which for several years had been spread from there with infested fruit trees and roses. As has been previously notified, the insect attacks and slowly destroys roses and most of the common deciduous pomaceous fruit trees, including apples, pears, peaches, plums, apricots, quinces, cherries, and medlars. It can be held in check by spraying, but it is such an insidious and destructive pest that the Government has deemed it advisable to do what is possible, within reason, to effect its extermination. If left to itself it would undoubtedly be spread from garden to garden and farm to farm by passive agencies, and, sooner or later, would get into the nurseries in affected parts of the country, and then, despite the best supervision practicable, it would now and again be sent out with plants, and centres of infestation throughout the Union thus become established. The process might be a slow one, but it would certainly be a sure one, and in time the whole country would become troubled with the pest just as the whole country has become troubled with the common Red Scale on citrous trees.

The infested nursery has already been dealt with. Without any material exception every plant in the place of kinds on which the scale was found, together with every plant of every kind that is recorded to be subject to attack, and every plant of other kinds that it seemed likely might harbour the pest, although there is no record of its ever having been found on such plants, have been dug out and burned. All the remaining nursery stock, other than some tender florist plants to which no suspicion at all was considered to attach, has been taken over by the Government and removed to a site in the neighbourhood where it will be grown in quarantine. This stock consists largely of palms, certain creepers, chrysanthemums, and other half-hardy ornamental plants, and some kinds of trees, principally conifers, that are recorded not to take the scale. As a further precaution, arrangements have been made that no nursery stock of any kind that the Government may think likely to take the scale be again grown on the premises for an indefinite period. The infested nursery having been cleared out, steps are now being taken with respect to the infested private premises. A limited area round about the nurseries infested, and quite a number of gardens in Pretoria and its suburbs and a few further away, have become infested by fruit trees and roses introduced from the nursery. Fortunately, the nursery was largely a floral establishment. Few fruit trees were propagated in it, and the sales of stock that are likely to have carried

the scale appear not to have been numerous. A systematic garden to garden inspection is to be made in Pretoria and its vicinity, and sendings of plants which it is thought may have carried the pest farther away are to be looked up; and wherever the insect is found, drastic measures to secure its extermination are to be employed. There is some hope that by these means the pest will be altogether eradicated, and at least its spread will be greatly retarded and the unfortunate time when it reaches nurseries put off indefinitely. Suspected as well as infested plants are to be destroyed, and arrangements with owners to admit of this being done are to be made wherever possible. The Government now has authority to destroy infested plants, and will have authority to destroy suspected plants as well as soon as the "Agricultural Pests Act, 1911", is put into force. Hence it is only a matter of time when the Government can effect the destruction of any plants which owners may now decline to have destroyed or concerning which an agreement as to terms cannot be reached under the present circumstances. The new Act stipulates how compensation shall be assessed in cases of disagreement.

It is inadvisable to use food plants of the insect in replanting ground from which infested trees have been removed until all suspected trees round about have been destroyed. There is no danger in sowing the land with grains or lucerne or in using it for any vegetables or other short-lived plants or plants that die down in the winter.

Export of Potatoes.

By A. E. Bester, Acting Government Horticulturist.

The following information received from Mr. E. Downing, of Natal, together with reports from the Trades Commissioner, is published with the idea of placing the possibility of this export before growers and farmers.

It should be borne in mind that potatoes for the purpose must be specially raised; by this I mean varieties must be grown which are suitable for the purpose, such as Royal Kidney, Duke of York, Early Puritan, and possibly British Queen; and the land must be treated with liberal doses of manure.

The varieties mentioned should produce an article suitable for the London market. If the business is to be worked up it must be done on those lines. London buyers know what they want, and if we want their money we must grow potatoes to supply their requirements. A lengthy experience of Covent Garden as a market convinced me many years ago of the fact that if the grower will supply a suitable article at the proper season, the buyers are always prepared to pay good prices.

Mr. E. Downing's communication is as under:—

The quantity shipped was twenty tons (i.e. 200 100-lb. crates), contributed by various members of the Rosetta Association, and the varieties were Up-to-Date and Carman.

Owing to these potatoes being packed in crates with air spaces between the slats they arrived in London in a dry condition and were not classed as new potatoes; they were sold as old potatoes and realized £8 per ton, which was 30s. higher than the best Scotch potatoes were fetching at the time.

This shipment was distributed widely, and though a failure financially the result was a mass of information from which it was deduced that, given reasonable freight, a profitable export business could be done at a time when in a normal season every market in South Africa is glutted. Exhaustive experiments were made with various materials for wet packing, and in anticipation of further experimental shipments cases were imported, but owing to the unsympathetic treatment received from the Conference Shipping Lines and their refusal to assist in the establishment of this export business by some concessions in freight for the first season, the business was reluctantly abandoned.

The following is a summary of the information obtained and the experience gained:—

Potatoes to be classed as new must be what is known in the trade as "scraper", i.e. so new that the skin can be easily removed

with the thumb nail. Small potatoes are preferred. Mr. Poupart, of Covent Garden Market, gives the grades as follows:—

Grade 1, largest; Grade 2, seven to nine tubers to the 1 lb.; Grade 3, twelve to fourteen tubers to the 1 lb.; of which Grades 2 and 3 are the most saleable, and in fact Grade 1 is not wanted. Grades Nos. 2 and 3 correspond with the South African Grades 2 and seed, and the seed size (twelve to fourteen tubers to the 1 lb.) is most saleable of all.

Varieties.—The consensus of home opinion was that buyers did not trouble about names and varieties, but that there was a distinct prejudice against certain potatoes, such as Up-to-Date, which do well in South Africa.

Seed was obtained of all the varieties in favour on the London market and also from the Canaries, and planted in this district; not one of these varieties was worth growing.

The requirement of the home market is a kidney variety, clean in skin, with shallow eyes and uniformly small in size. Carman, which is a flattish oval variety, is not suitable.

One of the largest vendors of new potatoes in England suggested that South Africa should export the variety "of the required type best suited to local conditions".

Mr. Poupart reported very favourably on the Up-to-Dates shipped, and reading between the lines there was nothing wrong with them but the name. The conclusions arrived at were:—

(*a*) That the Up-to-Date or any other variety of the kidney type is the most suitable for export.
(*b*) That the name should be altered to South African Kidney.
(*c*) That to produce small tubers of the size suitable for export the potatoes should be planted closer than usual, say, 24 inches between rows, and 8 or 9 inches between sets, or even closer if practicable.

Packing.—New potatoes from the Canary Islands are packed in boxes to hold 70 lb. in addition to the packing.

Mr. Poupart advised packing in boxes to hold 56 lb. net, so that two might go to the cwt.

Boxes should be close fitting, so that none of the packing can leak out, and be lined with glazed brown paper.

The only satisfactory material for packing new potatoes is peat-dust, which has to be imported in compressed bales, and costs landed about £5 per ton. This price might, however, be reduced by importing direct, by sailing ship, in large quantities.

The potatoes should be packed in layers, with wet peat-dust between each.

Potatoes were packed in wet peat-dust and kept at Rosetta, and the boxes opened six weeks later, when the potatoes opened out in good order with soft skin and with all the appearance of new potatoes fresh out of the ground. Experiments were at the same time made with other packing material, such as sawdust and a mixture of peat-dust and sawdust, but the results were not satisfactory.

The boxes imported (to hold 70 lb. potatoes and packing) cost 10d. Durban in shooks, and have since been disposed of to fruit growers for packing pineapples.

The average price for new potatoes in London was at the time £11 per long ton, but frequently much higher prices were obtainable.

The total charges were estimated at £8 per ton, made up as follows:—

	£	s.	d.
Cases—32 set up and hooped, at 1s.	£1	12	0
Peat-dust	0	10	0
Freight through	3	11	6
Home charges, cartage, commission, etc.	1	7	6
Labour, packing, transport, and sundries, say	0	19	0
	£8	0	0

This only left £3 per ton for the grower and was not considered remunerative.

The sea freight is calculated on measurement, and one ton of packed potatoes measures between 70 and 80 cubic feet, or nearly two tons.

New potatoes need to be carried in ventilated holds; deck-space is unsuitable on account of the drying-out.

The Conference Lines refused to carry new potatoes at dead weight instead of measurement for one season to test the market, and the Natal Government Railways declined to make any reduction on the then excessive rates (which have since been reduced nearly 50 per cent.) except for fully twenty-ton trucks station to station traffic at owners' risk.

A large number of growers had at the time made their arrangements to export, and the Rosetta Association would have made a weekly shipment of at least twenty tons throughout the season had it been possible to obtain some reduction in freight.

The best time to put new potatoes on the London market is early in the year, and there should be a good market during the months of January, February, March, April, and part of May, but in the latter half of this period South African potatoes would have to compete with those grown in the Canary Islands and elsewhere. It is quite possible to put new potatoes on the London market for the Christmas trade from the lower midlands of Natal, as when farming at Inchanga I usually had potatoes ripe by the end of November. Coast potatoes would be earlier still, but I am inclined to think they would not stand export, as their keeping qualities are inferior to those grown inland.

TRADES COMMISSIONER'S REPORT No. 368.—POTATOES: POSSIBILITIES OF EXPORT.

I noticed a small shipment of potatoes (which I understand were sent from East London) at Covent Garden, and discussed the matter fully with the commission agent entrusted with the sale. It is apparent that these potatoes were intended to be sold as new potatoes or "scrapers", but they were unsuitable for this purpose, and they were rather too old and dry looking. Moreover, the variety, which I believe was "Early Rose", is not very much appreciated. They were packed in crates containing about 56 lb. These potatoes had been on the market some days without having any reasonable offer for them, and it is doubtful whether 4s. per crate will be realised.

On a previous occasion I made a full report upon the possibilities of shipping potatoes to this market, and I will repeat a few essential points which are necessary to observe in case any person may desire to experiment further in this direction:—

(*a*) The potatoes must be of a pure white kidney variety. The best seed must be imported for this purpose, and advice should be taken before making any serious experiments as to the best varieties. At the present time the King Edward, Up-to-Date, and Royal Kidney are the most favoured varieties.

(*b*) The packing is a matter that should also receive serious attention. They should be packed in about half-cwt. boxes, not crates (which should be lined with paper), and peat-moss and sawdust slightly damped, the object being to bring the potatoes here in a perfectly bright and fresh condition. Also the boxes should be packed upside down, the bottom being nailed on after the box is full. The potatoes should be packed neatly by the hand, not thrown in the box; this gives the box when opened a neat and attractive appearance.

(*c*) Buyers like to see the potatoes with a rather red appearance, as if they have been grown in red soil. If growers in South Africa have been growing them in any other soil it is possible that by adding a small amount of dry red clay-dust to the peat-moss they may acquire this colour. I am only giving this hint, which appears to be the methods adopted in other countries from where potatoes are shipped to this country, as I have every reason to believe that the potatoes are not grown in a red soil.

(*d*) It is essential that the potatoes should be young and should scrape easily, or peal with the finger.

(*e*) The tubers should be a medium and rather small size. Large potatoes and very small ones are unsuitable.

(*f*) The best season for new potatoes to arrive on this market is, of course, before Christmas, and up to about the middle of March only a limited quantity will be acceptable. From that time up to the end of April large quantities of new potatoes arrive from the Canary Islands, and are sold for about 2d. a lb. wholesale. It is possible that even then, provided South African growers ship a suitable variety, they may compete.

(*g*) If growers will try experiments on the lines suggested it is possible a successful export trade may be created.

COPY OF TRADES COMMISSIONER'S REPORT No. 433.- POTATOES: POSSIBILITY OF EXPORT.

In reply to the communication from the Acting Secretary, Pretoria, dated 15th May, 1911 (Ref. 8779), regarding varieties of potatoes most suitable for expert, I have to report that I have again approached some of the leading potato merchants in Covent Garden,

including Mr. J. B. Thomas (a firm of many years' standing and experience in the potato trade, who gave me the information on a previous occasion as to the best varieties for this market). Mr. Thomas maintains that the three varieties mentioned in my report are the best varieties and most suitable for export, whereas other authorities, though they do not altogether agree with Mr. Thomas, do no consider that Up-to-Dates are unsuitable. It must be borne in mind that different dealers have different views and favour various varieties.

At the time when my previous report upon this subject was drawn up I adopted the usual course of consulting those in the trade as to the varieties most appreciated on these markets, and furnished you with the information supplied to me.

I note, however, that the Acting Horticulturist does not agree with these gentlemen, and I appreciate that his views must be considered, as it must be borne in mind that potatoes grown in South Africa may have other characteristics which will make them unsuitable for export, which characteristics may be altogether different if grown under other climatic conditions.

I observe that the Acting Horticulturist agrees that Royal Kidney and King Edwards are suitable varieties to grow.

Those on the market whom I have consulted also recommend the Eclipse as being a very excellent early potato for this market.

Gal-Lamziekte Investigations.

QUERIES FOR FARMERS.

A SET of queries has been prepared and issued by the Acting Director of Veterinary Research with a view to obtaining statistics in regard to the prevalence and incidence of the disease gal-lamziekte. These queries are issued in circular form with space for replies, and are being sent to a number of individual farmers, but in order to reach as wide a circle of stock-owners as possible it has been thought advisable to reproduce the queries in the *Journal*, so as to give any farmers who may be willing to assist Dr. Theiler, but who have not received a copy of the circular, an opportunity of replying to the questions so far as they are able. Correspondents should address their replies direct to the Acting Director of Veterinary Research, Pretoria. Wherever possible give dates and the number of animals which have come under your observation.

1. What are the symptoms by which you recognize that an animal is suffering from the disease? Please give them in the order they appear, in cases of rapid course and in cases of slow course.
2. Have you submitted blood smears of lamziekte cattle for microscopical examination, and what were the results?
3. What are the usual post-mortem symptoms you consider typical for gal-lamziekte?
4. What is the length of time an animal usually suffers from this disease (*a*) when it dies and (*b*) when it recovers?
5. Are the animals which recover from the disease immune, or do they contract it a second time or more?
6. What kind of cattle contract it, and which are most liable, oxen, bulls, cows in calf, heifers, heifers in calf, or calves, and what were the respective numbers in your experience?
7. Are oxen on your farm grazed together with the cows, etc., or are they kept in different paddocks?
8. Have you observed, on farms known to be infected with gal-lamziekte, any other animals (sheep, goats, horses, etc.) to be suffering from gal-lamziekte at the same time, previously, or later, and what are the symptoms and post-mortem lesions of those animals?
9. Were the cattle locally born or introduced from other parts of South Africa, and where from; and which are the most susceptible to the disease?
10. What are the conditions of tick infestation on the farm on which you noticed gal-lamziekte, in which season of the year, and on which parts of the body (ear, under tail, etc.)? (Request to forward tick for identification.)
11. What was the number of animals under your observation in the various years; how many of these contracted the disease in each year, and how many contracted the disease a second or more times?

12. What was the number of deaths of sick animals under your observation from this disease during the various years?
13. Can you, for comparison's sake, give the number of sick animals and deaths on the neighbouring farms, and do these farms differ from yours; if so, in what respects: is there the same breed of cattle?
14. Is the farm on which you made your observations fenced, and was it fenced prior to the disease; are there any camps on your farm, and is the disease more frequently met with in one camp than another, and in which way do these camps differ (water, altitude, pasture, etc.)?
15. Are there any peculiarities on the farm where you noticed the disease with regard to geological formation (veld, vleis, bush, water, pans, brak water, etc.)?
16. Where, in your experience, have cattle principally contracted the disease, on high or low lying ground, and how long have they been running on such ground before the disease breaking out?
17. What is the water supply on the farm on which you noticed the disease (river, spruit, vleis, springs, borehole, etc.)?
18. Was the disease more prevalent in certain years than in others, and which were these years; and do you remember the climatical conditions of such years (wet, dry, hot, etc.)?
19. Was the disease more prevalent in certain seasons of the year than in others? If so, which were the months during which the disease was most prevalent, and what were the climatic conditions during those periods (drought, rains, heat, cold, etc.)?
20. Do animals on farms where this disease is known show any peculiarities in the way of a craving for earth, bones, etc., or have they any other abnormal tastes; and do these animals contract in the course of events lamziekte or stijfziekte (laminitis) or any other ailment?
21. Are there any local causes to which the disease is popularly ascribed?
22. Have you noticed any connection between burning of the grass and the disease? Has it been noticed that the disease originated on the so-called "brands"? At what times of the year were such brands made, and what time is considered to be the proper one in your part of the country for grass burning?
23. How long has this disease been known on your farm and in its neighbourhood and in your part of the country?
24. Can you, or any of your friends or relatives, remember the time when the disease was not known? If so, in what year did it make its first appearance? Or can you connect it with any particular event; for instance, moving of stock (healthy or sick), trekking generally, transport-riding?
25. Can you give instances in which the disease followed the introduction of sick cattle, and how long after did it break out?
26. In cases of this disease, is it the habit to bury the carcasses? If so, does burial of the carcasses mean the disappearance of the disease?
27. Did moving cattle stop the disease, and if so, how long after moving did the disease disappear?
28. How was the moving effected: into healthy farms, or into farms previously known to be infected, and what was the result in the various instances?

29. What preventive or curative measures were adopted, and with what result?
30. Which treatment was the common one applied, and with what result?
31. How do you distinguish between ordinary gall-sickness and lamziekte? Have any of your diagnoses been controlled by microscope, and what were the results?
32. Did you have anthrax on your farm (confirmed by a veterinary surgeon or by microscopic diagnosis)? Have you inoculated, and did lamziekte disappear after this inoculation?
33. Is stijfziekte (the disease where the hoofs grow out and described in the *Union Agricultural Journal*, No. 1) present on farms where lamziekte is known, or is there any disease with symptoms of stiff-sickness, but where the hoofs do not grow out?
34. Is the stijfziekte-bosje (*Crotalaria burkeana*) on your farm, and in what quantity, or any other allied plant? (Request to send plants to Government Botanist.)
35. Any definite information as to the effect of bonemeal for the prevention of lamziekte and stijfziekte (where the toes turn up) or any other sort of stiff-sickness?
36. Any other observations, not provided for in this query sheet, should be mentioned here.

Outbreaks of Animal Diseases.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF AUGUST IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

Province and District.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
1.—CAPE PROVINCE—																
Alexandria	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Caledon	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Cape	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.
Cathcart	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Fort Beaufort	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Herschel	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Kingwilliamstown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Komgha	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Kuruman	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Queenstown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Stellenbosch	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Native Territories:—																
Tembuland—																
Umtata	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Engcobo	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.
Mqanduli	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Transkei—																
Kentani	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Nqamakwe	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Port St. John's	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Willowvale	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF AUGUST IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

PROVINCE AND DISTRICT.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
I.—CAPE PROVINCE (*continued*)—																
Native Territories:—																
Pondoland—																
Libode	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Flagstaff	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
East Griqualand—																
Umzimkulu	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Qumbu	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tsolo	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Mount Frere	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
II.—NATAL—																
Estcourt	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.
Weenen	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Umvoti	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Inanda	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Lion's River	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pietermaritzburg & Umgeni	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Impendhle	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ipolela	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Richmond	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Ixopo	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alfred	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alexandra	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vryheid, Ngotshe, and Babanango	.	.	.	.	.	.	.	.	.	46	.	.	.	.	.	.
Utrecht	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.
Paulpietersburg	.	.	.	.	.	.	.	.	.	13	.	.	16	.	.	.
Zululand	.	.	.	.	.	.	.	.	.	16	.	.	4	.	.	.

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RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF AUGUST IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

PROVINCE AND DISTRICT.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sporsziekte.
III.—TRANSVAAL—																
Barberton	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Bethal	.	.	.	.	.	.	.	.	.	25	.	.	.	.	.	.
Bloemhof	.	.	.	.	.	.	.	.	.	93	.	.	.	.	.	.
Carolina	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.
Ermelo	.	.	.	.	.	.	.	.	.	15	.	.	.	2	.	.
Heidelberg	.	.	.	.	.	.	.	1	.	58	.	.	.	.	.	.
Krugersdorp	.	.	1	.	.	.	.	.	.	11	.	.	.	.	.	.
Lichtenburg	.	.	.	.	.	.	.	.	.	70	.	.	.	1	.	.
Lydenburg	.	.	1	.	.	.	.	1	.	10	.	.	.	.	.	.
Marico	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.
Middelburg	.	.	.	.	.	.	.	.	.	28	.	.	.	.	.	.
Piet Retief	.	.	.	.	.	.	.	.	.	23	.	.	.	.	.	.
Potchefstroom	.	.	.	.	.	.	.	.	.	65	.	.	.	.	.	.
Pretoria	.	.	.	.	.	.	.	1	.	15	.	.	.	.	.	.
Rustenburg	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.
Standerton	.	.	.	.	.	.	.	.	.	39	.	.	.	.	.	.
Wakkerstroom	.	.	.	.	.	.	.	.	.	14	.	.	.	.	.	.
Waterberg	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Wolmaransstad	.	.	.	.	.	.	.	.	.	79	.	.	.	.	.	.
Witwatersrand	.	.	.	1	5	.	.	.	.	2	.	.	2	.	.	.
Zoutpansberg	.	.	.	.	.	.	.	.	.	17	.	.	.	.	.	.
IV.—ORANGE FREE STATE—																
Bethlehem	.	.	.	.	.	.	.	.	.	13	.	.	.	.	.	.
Bethulie	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF AUGUST IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

Province and District.	Scabies (Equino).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
IV.—ORANGE FREE STATE (*continued*)—																
Bloemfontein and Brandfort	.	.	.	.	.	.	.	.	.	21	.	.	.	.	.	.
Boshof	.	.	1	.	.	.	.	.	.	42	.	.	.	.	.	.
Edenburg	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.
Fauresmith	.	.	.	.	.	.	.	.	.	65	.	.	.	.	.	.
Ficksburg	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
Frankfort	.	.	.	2	.	.	.	.	.	3	.	.	.	.	.	.
Harrismith	.	.	.	.	.	.	.	.	.	34*	.	.	.	.	.	.
Heilbron	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Hoopstad	.	.	.	.	.	.	.	.	.	28	.	.	.	.	.	.
Jacobsdal	.	.	.	.	.	.	.	.	.	23	.	.	1	.	.	.
Kroonstad	.	.	.	.	.	.	.	.	.	28	.	.	.	.	.	.
Ladybrand	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Lindley	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.
Philippolis	.	.	.	.	.	.	.	.	.	25	.	.	.	.	.	.
Rouxville	.	.	.	.	.	.	.	.	.	45	.	.	.	.	.	.
Senekal	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Smithfield	.	.	.	.	.	.	.	.	.	29	.	.	.	.	.	.
Thaba 'Nchu	.	.	.	.	.	.	.	.	.	13	.	.	.	.	.	.
Vrede	.	.	.	.	.	.	.	.	.	16	.	.	.	.	.	.
Vredefort	.	.	.	.	.	.	.	.	.	12	.	.	.	.	.	.
Wepener	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
Winburg	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Trompsburg	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.

* Incomplete.

Milk Records.

TWEESPRUIT EXPERIMENTAL FARM—JULY, 1911.

BREED AND NAME OF COW.	DATE OF LAST CALVING.	LB. MILK.	FAT TEST.
FRIESLANDS.	1910.		%
Nora	20th October	451	3·8
Gertje	13th October	587	3·8
Japke	1st June	426	4·0
Dijkstra	18th November	473	2·8
Trijntje	13th December	521	3·2
	1911.		
Anna	10th January	489	3·0
Rinske IV.	7th May	939	2·8
Veeman	11th April	975	2·6
RED LINCOLNS.	1910.		
Daphne	22nd December	440	4·0
	1911.		
Dirce	28th May	688	3·2
Crino	6th June	800	3·2

GROOTVLEI EXPERIMENTAL FARM—JULY, 1911.

BREED AND NAME OF COW.	DATE OF LAST CALVING.	LB. MILK.	FAT TEST.
SOUTH DEVONS.	1910.		%
Primrose	13th October	320	4·0
Merry Glass	19th November	245	4·4
	1911.		
Bertha	31st January	518	4·6
Sweetheart	18th March	536	4·4
Dauntless	1st May	649	4·2
Era	3rd May	884	4·0
NORTH DEVON.			
Gentle	20th June	729	4·1

Results of Egg-Laying Competitions.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

Fourth Egg-Laying Competition.—16th May, 1911, to 15th May, 1912.

RECORD FOR AUGUST, 1911, AND TOTALS TO END OF AUGUST.

Pen Number.	Owner.	Breed. (Six Birds to a Pen.)	Record for Month.			Total to Date.			Position to Date.
			Eggs.	Weight. oz.	dwts.	Eggs.	Weight. oz.	dwts.	
1	F. W. Nicholson..	Buff Orpingtons..............	59	126	12	64	137	11	24th
2	F. T. Hobbs.....	Silver Wyandottes............	41	76	2	73	133	15	26th
3	A. Riley.........	Black Minorcas (R.C.).........	33	58	12	79	137	2	25th
4	N. Cole.........	White Leghorns (Amer.)	91	175	1	168	322	10	17th
5	S. T. Jones......	White Leghorns (Amer.)	75	159	11	169	354	15	14th
6	H. Curtis..	White Leghorns (Amer.)	94	193	6	206	422	15	6th
7	S. C. Skaife......	White Wyandottes............	80	141	4	127	221	14	21st
8	A. Keppie.......	White Wyandottes............	76	134	6	145	258	13	19th
9	S. A. West.......	White Leghorns (Amer.-Danish)	89	191	10	171	364	10	13th
10	H. H. Bright.....	Black Leghorns..............	105	208	1	226	446	13	4th
11	B. Kauffmann ...	Brown Leghorns	112	236	5	179	379	9	9th
12	B. Kauffmann ...	Black Leghorns	62	131	5	157	331	4	16th
13	C. W. Pilkington .	Rhode Island Reds	30	68	2	65	149	2	23rd
14	W. P. Cowan	White Leghorns (Eng.)........	82	155	15	225	409	12	7th
15	A. J. Stacy......	White Leghorns (Aust.-Amer.) (Re-entered from last competition for second year test.)	110	232	4	204	438	2	5th
16	B. Kauffmann ...	White Leghorns (Eng.-Amer.)..	81	167	9	222	448	6	3rd
17	S. Smith	Brown Leghorns	81	166	0	152	309	14	18th
18	Mrs. H. H. Bright	White Leghorns (Aust.)	136	256	12	196	368	6	12th
19	N. Cole	Brown Leghorns	102	215	3	215	458	11	2nd
20	F. Molteno	White Leghorns (Amer.)	96	176	8	193	351	10	15th
21	C. H. van Breda..	White Leghorns (Aust.)	99	195	9	262	507	14	1st
22	Mrs. C. H. van Breda	White Leghorns (Amer.).......	77	149	12	193	373	10	10th
23	S. A. West.......	Brown Leghorns	104	196	2	207	390	15	8th
24	Graham, Hope & Co.	White Wyandottes	82	162	4	116	228	14	20th
25	R. V. R. Jones ...	White Leghorns (Amer.-Aust.) .	59	111	8	86	164	12	22nd
26	S. Smith	White Leghorns (Dan. & Amer.)	79	154	6	194	369	3	11th

MANAGER'S REPORT FOR AUGUST.

The total number of eggs for the month is 2135, the highest number in one day being eighty-one, and the lowest fifty-five, which is an improvement, but there would have been an appreciable increase upon this had twenty-one birds which have not laid at all this month, contributed their share. Twenty-one also have laid less than ten eggs each; the majority of the remaining 114 have laid well. It is unfortunate that there are these drones, for they not only pull down the records of their respective pens, but also of the competition as a whole; as it is now the spring, all birds should be laying, and laying well. Some contribute only on alternate days, others again take rests ranging from three to ten days; the usual cause of this is that the bird has not sufficient stamina for continuous laying. A good layer must necessarily have a strong constitution (she cannot put up a good egg record without it), and be able to lay twenty-three to twenty-six eggs per month at least, and I am pleased to say some of the birds have done so. While alluding to good and bad layers there is an important point I should like to touch upon; many of the white leghorns on the competition are from well-known good laying strains, and I notice there is a great difference in their laying qualities. The only reason for this, in my opinion, is that probably instead of the, we will say, six best layers of the progeny of each imported pen being mated back to their sire, and

the strongest son of the best layer to his dam, and so on each year, they have been mated promiscuously, and the poor layers (these will occasionally appear as reversions in every good laying strain), unintentionally of course, been bred from. Further, birds of one good laying strain have been crossed with those of another, which is almost as bad as crossing two breeds, for the best qualities that have been fixed in each are usually lost, and the poor ones predominate. When a pen of birds of good laying strain is imported, the work of the exporter should be continued and the strain still further improved by breeding only from the best layers, otherwise deterioration immediately sets in.

Twenty-four out of the heavy breed birds on the competition are now laying, the majority well. Evidently, although the progeny of good layers, they were not hatched early enough to commence laying before the winter set in. When this is the case they seldom do so before the spring. They should in this country be hatched not later than the middle of September—the beginning is better—and then brought on to maturity without a check.

The size of the eggs is very good, only two eggs being less than 1⅞ ozs., many ranging from 2 ozs. 4 drams to 2 ozs. 8 drams and over.

The six pens which have contributed the highest number of eggs for the month are:—pen 18, 136; pen 10, 105; pen 11, 112; pen 15, 110; pen 19, 102; pen 23, 104. The six birds with the highest record in eggs are:—No. 103, 27; No. 89, 26; No. 44, 25; and Nos. 37, 45; and 151, 24; each nine other birds have laid 23 eggs each. The six birds with the greatest weight of eggs are:—No. 89, 57 oz.; No. 1, 53 oz. 3 drams; No. 103, 51 oz. 12 drams; No. 114, 49 oz. 15 drams; No. 52, 49 oz. 3 drams, and No. 6, 48 oz. 6 drams. The health of the birds continues excellent. There has been only one bird which needed treatment of any sort; she developed sour crop with its accompanying ailment diarrhœa, which is much like that of enteritis; she was treated for four days with injections into the crop, by means of a syringe, of a solution of potassium permanganate, and fed on milk administered in the same manner, then returned to her pen, cured. One bird presented an interesting and rare case of displacement of the gizzard; she became very full and heavy behind, so much so that eventually the lower part of her abdomen and tail dragged on the groundas she walked. On examination a large body was felt very low down in the abdomen, which was diagnosed as an abdominal tumour: on making a post-mortem I found that it was a much enlarged gizzard, which, instead of being in its normal position above the intestines, was below them quite near the vent, and pressing upon the oviduct. Naturally the lower part of the oesophagus and second stomach were much elongated. A bird with such an abnormality is little or no good, for, in addition to the difficulty and ungainliness of its gait, the passage of eggs would be much impeded and egg-binding frequent.

The weather on the whole has been favourable for laying, especially the latter part of the month, although the nights have been cold the days have generally been warm and sunny, except during the first ten days, when they were usually dull and cloudy with some rain, August 10th being the wettest day we had since the competition commenced. The wind during the first half of the month was usually from the north-west, and the latter half from the south-east and rather cold, but fortunately the birds are well sheltered from this. I hope that next month will see as marked an improvement in the number of eggs as this one has shown. From 156 birds selected for a laying competition the total egg yield per month ought to average at least 3120.

REPORT ON No. 112, PEN 19.

On 12th August, this bird, which had always been fairly full and low behind, but not abnormally so, suddenly experienced difficulty in walking, her abdomen and tail dragging on the ground. On examination a large globular mass was felt low down in the abdomen, not far from the cloaca, which I diagnosed as rather a large egg or abdominal tumour; the last time the bird laid was on July 19th. I applied the treatment for egg-binding with no effect, and on further examination found that the mass was slightly elastic on pressure between the finger and thumb. I came to the conclusion it was an abdominal tumour, and recommended the bird to be changed as unfit to be retained on the competition. I may mention that several breeders, among them the Transvaal Government Poultry Expert, at different times examined the bird, and each diagnosed abdominal tumour, one being of the opinion that it was tubercular. The bird was kept by herself in a coop until 30th August, but there was no alteration in her condition. On 31st August, I made a post-mortem and found the mass to be an enlarged gizzard, abnormally situated low down in the abdomen and pressing on the oviduct, and below instead of as it usually is above the intestines; the lower part of the oesophagus and second stomach were naturally elongated, the other organs were normal, the bird was rather on the fat side, due probably to want of exercise in the coop.

In this condition she was quite unfit to be retained on the competition, for in addition to her difficulty and awkwardness in getting about she would always have some trouble in passing an egg and be subject to egg-binding. The condition was in my opinion incurable. This is an interesting and rare case, the cause of which I am unable to state, but probably it was due to the abnormal size and weight of the gizzard and laxity of its attachments.

ARTHUR LITTLE.

CENTRAL EXPERIMENT FARM, CEDARA.

RESULTS FOR MONTH OF AUGUST, 1911.
(Competition commenced 9th July, 1911.)

No. of Pen.	Owner.	Breed.	No. of Eggs.	Weight. lb.	Weight. oz.	Total No. of Eggs.	Total Weight. lb.	Total Weight. oz.	Position to date.
1	Mr. Greenough	W.L.	30	3	11	56	7	8	9th
2	Mr. Doidge	W.W.	23	2	12	59	7	5	8th
3	Mr. Firmstone	B.O.	43	4	10½	80	8	9½	2nd
4	Mr. Hutt	B.L.	47	5	3½	71	7	8½	4th
5	Mr. Mason	W.L.	27	2	14	41	4	1	13th
6	Mr. W. F. Chapman	B.O.	60	6	14½	81	9	5½	1st
7	Mr. McEwan	W.L.	26	3	3½	40	5	1½	16th
8	Mr. Stranack	W.W.	37	4	9½	70	8	7½	5th
9	Mr. Dewar	S.W.	40	4	2½	74	7	9½	3rd
10	Mr. J. J. Mann	W.L.	48	6	3½	53	6	10½	13th
11	Mr. Coupland Ferguson	W.W.	44	5	0½	70	7	15½	6th
12	Mr. Guy Blundell	W.L.	45	5	14½	55	7	2	10th
13	Mr. Woodward	W.L.	19	2	8½	20	2	10½	18th
14	Mr. Wilson	B.O.	48	6	3	55	7	6½	11th
15	Mr. Wilson	W.L.	30	3	15½	32	4	3½	17th
16	Mr. Wilson	B.M.	45	5	9½	54	6	10½	12th
17	Mr. J. J. Mann	W.W.	43	4	13½	70	7	11½	7th
18	Mr Hulett	W.L.	29	3	10	49	6	0½	14th

EXPLANATION OF BREEDS:

W.L.—White Leghorns.
W.W.—White Wyandottes.
B.O.—Buff Orpingtons.
B.L.—Black Leghorns.
S.W.—Silver Wyandottes.
B.M.—Black Minorcas.

Correspondence.

This section will be set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture will be particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria", and written on one side of the paper only.

BRANDING WOOL BALES.

To the Editor of the *Agricultural Journal.*

Sir,—In your correspondence pages of the September issue of the *Journal* I notice a criticism by Mr. H. Findlay, of 27 Castle Street, Capetown, in which he strongly deprecates the method of branding wool bales as advocated by me in my article "Branding wool bales for market", which appeared in the July issue of this *Journal.* In the first instance, Mr. Findlay says that I said farmers should put distinctive marks on the *sides* and end of their bales. Now, if Mr. Findlay will carefully read the article he will find that the word sides was not used, but *side.* Mr. Findlay mentions that as the bales are all stacked flat in tiers of three in the warehouse, the marking on the side is thus rendered valueless. By this statement one is led to believe that bales of wool should be marked solely for the purpose of being stacked in tiers in a warehouse. He seems to forget that there are other purposes for which bales are branded.

Now 99 per cent. of the wool-selling brokers will advise the grower to brand his bales at least on one side and end with large legible letters, with the following inscription on one side: Name or mark of owner, name of farm or district beneath it, the class of wool, then the number of the bale. The following should appear on the end: Name or mark of grower, name of farm or district, then the number of the bale.

Now, if the bale is to be branded with large plain letters, I say that the end is not large enough for that purpose. If the brand happens to get obliterated (as is sometimes the case) and it chances to get mixed with another lot, that bale is very likely to go astray.

Why are bales of wool branded at all? For the purpose of identification, and I maintain that branding on one end only is not sufficient. Although Mr. Findlay has had many years' experience as a seller there are others who have also had many years of experience as sellers, and their advice to me is, brand at least on one side and on the end.

I should not like to see Mr. Findlay's system of branding adopted, viz., branding only on one end, as it is likely to cause trouble to those most directly concerned. Mr. Findlay informs us that bales are stacked in tiers of three high in a warehouse or store, which is perfectly correct, but not so in a sample room. At all up-to-date wool-selling centres they have sample rooms. One out of every five bales is taken from a clip and these are placed in rows on end in the sample room, and opened, with the side brands of the bales of the two rows facing one another. The buyer passes up and down the rows (which are arranged in rotation), and by reading the side brand can see what each bale is supposed to contain and if it corresponds with the catalogue and the wool it represents.

Most growers brand their bales on one side and end for their own protection, and you cannot get away from the fact that it is a great help to the stackers and others who have to handle the bales; in this way, that if a bale was only branded on the end, and it happened to be standing on that end, any one wishing to see the brand would have to upset it, whereas if the bale had one side branded this would not be necessary.

I have classed and sorted a good many bales of wool in more countries than one, but I cannot remember ever seeing a clip of wool with the bales only branded on one end.

I wonder if the London wool brokers will agree with Mr. Findlay's system of branding?

The leading wool-selling house in Australasia is Dalgety & Co. I happen to know Mr. Rowe, their wool valuer and auctioneer, who sold 93,659 bales of wool in Sydney last season. Altogether the firm in question disposed of 426,635 bales in Australasia and London

last season. 1,642,555 bales were sold in the Commonwealth last year by all the brokers. I have reason to know that these bales were branded at least on one side and one end.

The above firm owns several large sheep stations in New South Wales and Queensland. One would think that such an up-to-date firm would give instructions to the managers of the company's sheep stations to see that the bales from their different places were only branded on one end, if it were unnecessary to brand on the side as well, thereby saving that amount of labour.

Does Mr. Findlay mean to imply that all the wool growers have been over-branding their bales for all these years? If so, why haven't the wool-selling brokers advised their clients accordingly?

I have before me a practical handbook on Wool Classing, etc., by George Jeffrey, Esq., of the firm of Bagget, Shakes & Lewis, wool brokers, Adelaide, South Australia. He is the head of their wool department. He says, in his concluding remarks in regard to pressing and branding, page 74, "It must be understood that in order to prevent mistakes the name of the station or farm, and number of the bale should be plainly marked on at least two places on the bale, one *side* and one end."

So that your readers will observe that I am not the only advocate of such a system of branding.—Yours, etc.,

CHAS. MALLINSON.
Government Flockmaster and Wool Expert (Transvaal).

SALT AND LAMZIEKTE—A SIMPLE "RAAD".

To the EDITOR of the *Agricultural Journal*.

DEAR SIR,—I have read Mr. Dugmore's letter, and while reading it the thought struck me that the natives of South Africa know the only cure for lamziekte. Mr. Dugmore brings forward a lot of different arguments, and at the end of his long letter brings wild onions in, presuming, I suppose, that they might have something to do with lamziekte. Well, why I say the natives know a cure is that about a month ago I lost a cow from gal-lamziekte. I gave her a mixture of 1 lb. epsom salts, mixed with ginger, the same day I noticed it (being a milch cow). I suppose it was the day she got sick, but the end was death, although I kept her in a shady spot. I have an old herd, and I spoke to him about the lamziekte, and his reply was, "Yes, baas, you white people brought it to this country with your salt". I asked him what he meant, and he then explained that the Griquas used to farm with thousands of cattle, and never knew of lamziekte. But they never gave their stock any salt. They used to look on salt as a sweetmeat, and to this day they do not feed their stock with salt. He named different farms where cattle are extinct, and yet the Griquas used to keep hundreds on the same farms, and now that white people are living there all the cattle they had died of lamziekte. I broached this to a Langeberg (British Bechuanaland) farmer and this is what he told me. He got one of the application farms and went there with about 25 head of cattle. After five years he still had only 25, while he had a Kaffir neighbour losing no cattle and increasing in numbers year by year. He spoke to this Kaffir and he (the Kaffir) told him exactly what the old Griqua told me (the old boy is about 75 to 80 years old). Since then he has not lost a single head of cattle, but he never gave them any salt again, and he assured me that he tried it with his goats with the same good results. Some might say stinginess is at the back of this, but I think if this remedy is first given a trial we will hear different opinions. The soil of Griqualand West contains a lot of salt (proved by the saltpetre mines), and I think the cause of lamziekte is too much salt.

I hope a few farmers will give the above a trial.—Yours, etc.,

SELF-HELP BEST RECOMMENDATION.

Hay, 21st September, 1911.

SCAB AND ITS TREATMENT.

To the EDITOR of the *Agricultural Journal*.

SIR,—In your August issue I notice a letter on the above subject signed R. Warren, and seeing that a good many farmers use the *Journal* as a source of information, I consider the Agricultural Department should observe some discretion in printing in its columns letters advocating such a retrogressive policy as expressed in Mr. Warren's letter.

Scab will never be eradicated in South Africa if the policy of using sheep as a medium for collecting scab insects in old kraals, etc., is adhered too. In the first place, sheep will never collect all scab insects in an infected kraal between the first and second dipping, and, as a consequence, such sheep will continue to break out with fresh scab after second dipping.

Secondly, if sheep pick up the insects, say, seven days after the first dipping, their eggs wil not hatch till some considerable time after the second dipping. The natural consequence would be that sheep would never be cured of scab, and, instead of collecting the scab insects, the sheep would be a means of spreading and infecting clean veld.

Hoping you will find room in your columns for this letter,—Yours, etc.,

W. T. ELLIOTT.

[Mr. Warren's letter should be read as an experience, not as advocating a deliberate policy.. In the conditions that prevailed in those bygone days many things were done which could not be tolerated now. Further, these pages are reserved for the expression of individual opinion and the Agricultural Department is in no sense responsible for views here published. See heading.—EDITOR, *Agricultural Journal.*]

To the EDITOR of the *Agricultural Journal.*

SIR,—The letter on scab appearing in the August number of the *Agricultural Journal* must have been read (if read at all) with something like a groan by every scab inspector from the Cape to the Zambesi. After all that has been said, written, and preached on the subject of scab eradication and the necessity for the proper disinfection or burning of kraals which may retain the infection for years, the writer of that letter asks " Why not use the sheep as a collector of the scab insect, the same as cattle are used to collect ticks ? " In other words we are advised to drive our sheep into scabby kraals to pick up scab and then get rid of it by a second dipping (not every week as in the case of cattle).

Man is born to trouble, and a farmer is no exception, but why go out of one's way to look for trouble in this painfully foolish manner ? I have no wish to cast any doubts on the efficiency of the sheep as a collector of scab insects ; the trouble begins when you want to get rid of those same insects.

I would also like to ask the writer of that letter what is the meaning of the expression " fairly clean " as applied to sheep. If it means the same as moderately scabby it would probably be better to discard such expressions entirely and, as far as scab is concerned, divide sheep into two classes only—clean and not clean.—Yours, etc.,

Mooihoek, P.O. Thaba 'Nchu, 11th September. G. INGHAM.

To the EDITOR of the *Agricultural Journal.*

SIR,—So much has been said about the above subject and its eradication that it cannot help attracting sheepowners' attention. We are aware of the fact that the Government is doing all in its power to help the farmer. Scab inspectors are appointed in all districts, yet it would appear to be an absolute wrong system. How can A keep a clean flock of sheep if B, C, and D are] trekking freely through his farm with their scabby sheep. For instance, in this part is one farmer to every fifty who is the happy possessor of a dip on his farm and who is nothing loth to let his fifty neighbours bring their scabby sheep to be dipped at his farm at the rate of 1s. 6d. per hundred. I should suggest that such dipping be entirely prohibited, and that the Government provide movable dips which each farmer can obtain in his turn at the rate of, say, 1s. 6d. or 2s. per hundred. I am confident, if such a system should be adopted, it would go a very long way towards entirely eradicating that dreaded pest.—Yours, etc.,

P.O. Val, 28th August, 1911. A. TABACK.

KING ISLAND MELILOTUS AND ITALIAN RYEGRASS.

To the EDITOR of the *Agricultural Journal.*

SIR,—In your issue for September, Mr. Richardson, of the Premier Mine, Transvaal, asks for information regarding " King Island Melilotus ". A few years ago I got some seed of this plant direct from King Island and tried it in my vegetable garden. I found that it grew very well and soon attained a height of about 30 inches, when it came into flower. My stock did not care for it in the least, and I found it a most difficult weed to eradicate after it had once seeded. I have read in an Australian paper that it has been blamed for causing paralysis in cattle when they have been fed on it. *Re* pasture grasses for the Great Winterberg, inquired for by Mr. Miles : Judging from experience gained in the high veld of Natal, I should think that Italian ryegrass would be the most suitable grass to plant in the vlei mentioned, particularly as there seems to be so much rain, mist, and snow. This grass will stand any quantity of frost and remain perfectly green and very succulent right through the winter. It is fattening, and all stock are exceedingly fond of

it. It has the great advantage over oats, rape, etc., of never "blowing" the stock, and in feeding value is probably three times as good as oats (green). Italian ryegrass seeds very readily, and the seed may be harvested in the same way as oats, i.e. cut when ripe with the sickle, and spread out to dry like oats. When dry it should be thrown on to a bucksail and beaten with sticks, when the seed will all fall out very easily. I find it costs me ½d. per lb. to harvest the seed. One has to pay 4d. to 6d. per lb. to the seedsman. About 18 lb. of seed should be sown per acre. The great drawback to Italian ryegrass is that it only lasts a couple of years, when the land should be reploughed and replanted, or, better still, other fields sown with ryegrass and the old ryegrass land planted with something else. In the high veld of Natal we find January the best month for sowing this grass, that being about our rainiest time. If caught by a dry spell when just coming out of the ground the grass will burn off. When sown in January the grass should be from 12 inches to 30 inches high, according to the season and nature of the land, by the winter.—Yours, etc.

Highthorn, Estcourt, Natal, 24th September, 1911. WM. CARTER.

RESCUE GRASS.

To the EDITOR of the *Agricultural Journal*.

SIR,—I have noticed in several issues of your *Agricultural Journal* correspondence relating to rescue grass.

I myself have got some growing on my farm in the Elliot District. This farm is 5100 feet above sea-level, and consequently subject to a fair amount of frost.

On the same farm I have cocksfoot, paspalum, and rescue grass, and I find that the latter, in my opinion, is by far the best, for the following reason, that is, that in July and August when we require green food for our sheep this grass is at its best, whereas paspalum is burnt up by the frost, and cocksfoot is in comparison with rescue quite dry.

I have also noticed that it is called an annual grass. This, I am quite certain, is *not* correct, at least as far as my farm is concerned. It grows far better in winter than summer, and the sheep run away from the cocksfoot to reach it. I have had it now for some four years, and last year cut it *twice* for seed which I sowed last April; this I fed off in *July*, and it is now coming on splendidly. I consider it is the finest winter feeding we have got at the present time. I have shown it on my farm to a number of farmers, who all agree with me that it is the best winter feed they have seen. Trusting my experience may be of service to my fellow-farmers, and thanking you in anticipation for inserting this letter in your valuable *Journal*,—Yours, etc.,

J. D. H. BREDIN.

Umqwalana Nek, Cala,
9th September, 1911.

THE SECRETARY BIRD.

To the EDITOR of the *Agricultural Journal*.

SIR,—That the secretary bird at times, like the vulture, departs from the strict path of duty, and has a weakness, the former for young partridge, the latter for lamb, no sane man will attempt to deny, but to advocate their total destruction would, in my opinion, be a grave mistake.

Like Mr. F. H. Barber, I can also relate an incident in connection with the secretary bird, which happened years ago to the writer, which, however, contrary to Mr. Barber's story, goes to prove that at certain times of the season, the breeding season, the secretary bird is a veritable demon of destruction to all creeping things upon the earth.

The incident referred to above was the finding of a secretary bird's nest in a tree. On scaling the tree I found it contained one young bird. This nest was about three feet in diameter, in the centre of which sat my young friend surrounded by such a collection of snake skeletons, both large and small, as literally to astound one. Some of these, by their size, I feel confident, were those of the black ringhals, a deadly snake which abounds in that locality. Any impartial man scanning the contents of that nest could but come to the conclusion that the secretary bird, although at times a sad poacher, is nevertheless a benefactor to man, and we should consider well before adopting drastic measures with him, and thereby upsetting the balance of nature.—Yours, etc.,

W. A. HART.

Narrow Vale, Ugie, East Griqualand, C.P.

To the EDITOR of the *Agricultural Journal.*

SIR,—There seems a disposition in some quarters to minimize the usefulness of the secretary bird, and some people would be glad if it were exterminated, stating that it is not protected by law. The complaint against it is that it has been known to destroy young birds and leverets. This I don't doubt, but think that there are enough left to satisfy any reasonable sportsman. I have had the opportunity of watching the movements of the secretary bird for over half a century, and have never seen it do any serious mischief, and as an ornament to the landscape travellers from Le Vaillant downwards have always admired the stately march of the secretary bird. I have proved over and over that secretary birds kill mice and snakes, and, considering the number of venomous snakes, and the numbers of children and adults that die annually from snake bites, I think that any bird that assists man to keep down such vermin should be protected. For the same reason I think that the butcher bird should be protected. Complaints have been made against this bird that it now and then kills a pet caged bird. This is quite true; it appears to paralyze the caged bird with fear; but if the cage was large enough to give the bird scope, this might perhaps be prevented. On the other hand it kills and impales on thorns or barbed wire numbers of small snakes. Only to-day I saw a night-adder impaled on a thorn. The same bird will often give warning of the proximity of a dangerous snake; and if it has a nest in a fruit tree, and any other bird attempts to lodge in the tree, it will drive it away with the greatest ferocity, and thus helps to protect the fruit.—Yours, etc.,

O. BRIGG.

Herschel, Cape Province,
7th September, 1911.

THE JACKAL QUESTION.

To the EDITOR of the *Agricultural Journal.*

SIR,—When I wrote about twelve months ago, to the effect that we had started clubs all over the country for the exterminating of vermin, I did not think that our endeavours would meet with such success—our clubs, indeed, having been most successful; and again it has become apparent to me that general co-operation is the only means of getting rid of this pest. We killed nearly 4000 jackals, not to speak of other vermin; and apart from this it has to be remembered that, where poison is used, a great number of the animals are never found, as they generally return to their dens to die. I am writing these lines in the hope of encouraging other districts to follow our example, because I am convinced that, if the whole country would systematically co-operate, the jackal pest would soon disappear.

Some of the clubs use only dogs, others again only poison, and it has been proved that both methods are good. In the beginning the dogs did not prove so successful, but now they are better trained and it is not so difficult to trace and catch vermin as it was hitherto. Where poison is used one should not be too sparing, and should use it freely. Where jackals are plentiful, every farmer should distribute every month at least 100 or 200 pills—say, every week from 25 to 50. Where dogs are used at least once in a fortnight they should be hunted with, apart from the special drives. Only in that way will it be possible to exterminate the pest.

Of course, there are always people who do not want to co-operate and such are found here also; but if they cannot be convinced we will have to do without them. It is a great pity we have no law in the matter; but happily there are always enough progressive farmers in a district, so that we can get along well enough as we are.

Experience has taught us that the best bait for the poison are hares and badgers, but small pills made from the fat (netvet) of a sheep are also good. I usually take the netvet of a sheep that has been slaughtered when it is still warm and make a couple of hundred pills the size of a dove's egg, and place this in tins; this answers very well. On riding in the field I distribute them along the principal footpaths. It is always good to scorch them a little over the fire or plunge them in stomach dung to take away the smell. Never wait till the jackal has caught a sheep, but continually scatter the pills, even when you do not see any jackals about, and keep this up year in and year out.

And now what are the results of our co-operation? This, that we are now nearly freed of vermin. And, were it not that we are afraid that they will come to us from other districts, we could now let our sheep graze freely day and night. But the difficulty is, there are always jackals coming from other parts of the country.

Now I ask the other sheep farmers, shall we not co-operate in the whole of the Union to get rid of this pest? Our fathers have cleaned for us the country from lions, tigers, and wolves, and that with great danger to life: shall we not, then, do our utmost to exterminate jackals and wild cats? It is in our own interest. The wool industry is the staple product of the country and has a bright outlook; but our herds must be able to graze freely if we are to produce good wool. Jackal-proof fences are expensive to erect and do not always

answer the purpose, and only a few can afford to pay for them; but once we are freed from the jackals a seven-wire fence will be sufficient. Why, then, give way to the little pest and allow it to harm us? Where there is a will there is a way. Do you really want to perpetuate your name in grateful memory to your posterity? Then exterminate the jackal. Every one who kil's a jackal renders a service to the whole country.—Yours, etc.,

Bulhoek, Steynsburg, Cape Province, 22nd September. J. DU PLESSIS.

To the EDITOR of the *Agricultural Journal*.

SIR,—From time to time there has been considerable correspondence in the *Agricultural Journal* on the subject of jackal destruction, but I cannot say that to the present I have seen any scheme put forward towards this end which has appealed to me as likely to be effective or workable. In the July number of the *Journal* Mr. Conroy suggests the compulsory production to the magistrate by every farmer in the country of five jackal tails per month. I am afraid this would not work. There are many farms in the country almost immune from jackals, or at any rate with very few and these are difficult to capture or poison. I am constantly laying poison, but don't trouble to look for dead jackals. They are occasionally found, but I think mostly they die in holes and are not found.

Needless to say I was always a strong opponent of the policy of a payment by Government for jackals' tails, and I could never understand how it was possible that even progressive farmers could support such a policy. Many thousands of pounds were expended in this way, a large percentage of which went for tails imported from beyond the borders of the Cape Colony, and what is there to-day to show for the expenditure? If the Government had assisted farmers in putting up jackal-proof fences on the £1 for £1 principle, no doubt we would to-day have had some hundreds of miles of such fences of lasting benefit to the farmers as a result. Assistance in erecting such fences and in building dipping tanks for clearing the country of scab and ticks, we may fairly expect from any Government, but payment for jackals' tails, certainly not.

The extermination of vermin and eradication of scab and ticks is essentially work for the farmers themselves, and as the expense of so doing is not extraordinary, I don't see that there is a need for Government assistance, excepting in the building of tanks and erection of fences where required.

For the extermination of vermin my scheme would be this: Let every farmer in the country employ one native wholly and solely for the destruction of vermin. By this method some thousands of men will be employed constantly in such work and they will do so under the supervision of their masters. Native labour is not expensive, and for the purpose old men would do who are too feeble for more strenuous work. If farmers will not incur the trifling expense such a scheme would entail, let them suffer loss from the depredations of jackals. Unfortunately we have a class of farmer in this country who must be compelled by law to make effort, even in his own interests, and this makes it difficult to secure the co-operation necessary to make any scheme for the good of the country a success.

It is not only in the interests of stock farmers that we should try and exterminate vermin, but in the interests of game protection as well. We are constantly hearing complaints about the decrease of game in the country, and while I admit that there are a lot of scoundrels in the country who shoot game in and out of season, still I am confident that the chief cause of the decrease is the destruction of young game by vermin. On a recent visit to the Eastern Province I went out springbok shooting and in only a few hours that we were out two jackals were shot and another seen. These jackals were as fat as pigs. The farmers in that part farm only with horses, cattle, and ostriches. The few sheep which are kept for slaughter are not molested by jackals. What do the jackals fatten on? Another farmer in the neighbourhood has exterminated vermin and put a jackal-proof fence round his farm and now finds that the game on the farm is increasing with surprising rapidity. In my own neighbourhood, with the exception of springbok, very little game is shot, but I don't see that there is much or any increase in birds and small game. Jackals rarely trouble our flocks. I am sure that if such a scheme as I have suggested were generally adopted by the farmers of the country, a great deal of good would result in clearing the country of vermin.

As skins of jackals, etc., have a market value, some of the expense entailed in the destruction would be returned to the farmer.—Yours, etc.,

F. Richmond, W. H. WAYLAND.
P.O. Belmont, 1st September, 1911.

To the EDITOR of the *Agricultural Journal*.

SIR,—Whilst it is recognized that the jackal can only be exterminated by the construction of jackal-proof fencing, it is nevertheless a fact that owing to the initial cost

of constructing such fences being heavy, it is not within the means of every farmer to do so, and unless some practical assistance is given the farmer by the Government in this direction there will be more writing done than actual fencing.

What I do think the Government might do is to fence in a number of farms, say ten or twelve, so selected as to be able to enclose the greatest extent of land with, as far as possible, the least extent of fence. The farmers in the enclosed area to obtain a few good foxhounds, and to be compelled, if necessary, to organize periodical hunts within the enclosure so long as there remains any trace of a jackal. The benefit to each farmer would be almost as great, if not entirely so, as if his farm were fenced in by itself and the cost would be infinitely less.

I don't wish to say that the Government should do so from a philanthropic point of view. By suitable legislation farmers within the area could be made to defray the cost and interest pro rata, according to extent of their respective farms, in payments extending over a number of years. The Government might invite applications from farmers adjoining one another before fencing so that there would be no actual compulsion, at any rate at the commencement.

Personally I think the scheme is well worth a trial and would like to have the opinion of your readers on it.—Yours, etc.,

Contat, C.P., 25th September, 1911. J. E. CONTAT.

To the EDITOR of the *Agricultural Journal.*

SIR,—I noticed an article in the July number of the *Agricultural Journal re* extermination of jackals, etc., by Mr. John S. Conroy, and beg to differ when he points out how Government can encourage farmers to kill the jackal. His suggestion would not work. If the jackal must be exterminated it is the duty of the farmer to do it, and of every farmer to do what he can towards it.

Why cannot every district form a "Jackal Club", and let such a club then offer prizes to the three men who kill the largest number of vermin, and if Government wants to assist it would not be a bad idea if poison was distributed "free of charge". I should also like to remark that the large ostrich camps where no sheep graze and nobody is allowed to shoot is the best breeding place for the jackal.—Yours, etc.,

Beaufort West, 6th September, 1911. JACKAL POISON.

THE DIVINING-ROD PROBLEM.

To the EDITOR of the *Agricultural Journal.*

SIR,—There being evidence both for and against the divining-rod theory, I am personally neither a believer nor a disbeliever (but merely an "agnostic") in the matter.

On the face of it the subject is extremely difficult either of proof or disproof. Any crucial scientific test, to be reliable, would be very costly. Hence it has never been undertaken. Hence, too, the matter remains a kind of "hardy annual" or "bone of contention", so it will remain until a series of properly conducted scientific tests can be made to settle the question. Meantime the desultory skirmishing between the believers and disbelievers will continue. Belief is not a matter of will, but of sufficient evidence.

I must say that the arguments put forward in the September number of this *Journal* by Mr. Newman, *against* the divining-rod theory, appear to me to be as *strong* as those of Mr. Fraser (in the same *Journal*), in support of the theory, are *weak*.

Mr. Newman bases his disbelief in the divining rod upon certain clearly stated facts and *reason*. Mr. Fraser bases his belief in it upon "faith"—which faith again is based upon certain irrelevant suppositions and fancies (constructed by Mr. Fraser himself) which leave his "faith" very much in the same predicament as Stuurman's faith in the "big flat stones" that support the earth in space. (*Vide* Mr. Fraser's story of Stuurman and Jafta.)

Mr. Fraser's chief point put forward for his "faith" in the divining rod is the fact that there are certain trees which grow near water (such as the willow, etc.) whose twigs are used by some "diviners". The forked twigs of these water-loving trees, Mr. Fraser thinks, may have some mysterious power (in the hands of the "diviner", or stick witch-doctor) to indicate the presence of underground water often hundreds of feet beneath solid rock. Fantastic and far-fetched as this supposition is, it seems to be a solid enough base for Mr. Fraser's "faith" to rest upon.

This fantastic supposition is, however, entirely knocked out by the fact (pointed out by Mr. Newman) that many of the most famous and successful "diviners" in this credulous world of ours use *steel wire*, and not willow twigs. I am not aware that steel wire is botanically classed among water-loving plants, but no doubt this little flaw in his speculations on the divining rod will not in any way disturb the serenity of Mr. Fraser's "faith".—Yours, etc.,

Middelburg, Cape Province. E.

To the EDITOR of the *Agricultural Journal.*

SIR,—I have followed the controversy on this subject for some years past, and am very pleased to read the very lucid and interesting explanation given by Mr. G. B. Newman in your current issue. I trust this will serve to enlighten those of your readers who, whilst still advocating the infallibility of this divining-rod farce, are open to argument and conviction.

Personally, I was very much interested at one time in the problem, and whilst I soon discovered that the rod worked very nicely in my hand, I could not discard the fact that it did not always act at the psychological moment when passing over the first indication. This irregularity very naturally made the subject even more engrossing than before. I then decided upon a mechanical trial of the rod so as to eliminate the unconscious efforts on my part which I then suspected were the cause of its erratic indications. I accordingly made two small brass bearings very carefully and connected them in such a way that they remained 14 inches apart in true alignment, and were, in view of the electric current theory, insulated from each other. This connection was made of iron and was quite rigid. I also made two small axles to fit these bearings accurately, and to these I attached the respective ends of a freshly cut willow wand. Having got so far I then proceeded to fix up the mechanism, and added a small leather washer just to effect sufficient resistance to keep the wand at the desired angle of inclination. The next thing was to try it over every point where I knew water to be running. I also tried it over indications given me by expert water finders, but could not get the wand to give the slightest movement, although I gave it every chance. This served to show that the human equation did come into play somewhere when the rod was held in the hands in the orthodox fashion. I then cut the metal connection between pivots and inserted a piece of strong steel spring. And as soon as I used it I could make it bob up and down with the greatest ease imaginable.

It is abundantly evident therefore that the crux of the whole question lies in the fact that the unconscious relaxation of the muscles gives movement to the rod owing to its springy nature when correctly held.

There is also a letter by Mr. W. M. Fraser, which appears below the letter above referred to. He relies upon the direction of the sap's flow. Now, I also tried this experiment. I took a long, frail willow wand and planted it upside down where I knew underground water ran. It soon took root and is now growing most luxuriously. So that this theory seems quite wrong as, otherwise, the rod, which was not firmly planted, should have deflected of its own accord.—Yours, etc.,

Contat, C.P., 25th September, 1911. J. E. CONTAT.

CATTLE DIPPING TANKS.

To the EDITOR of the *Agricultural Journal.*

SIR,—A large number of tanks constructed since the outbreak of East Coast fever have been found unsatisfactory inasmuch as they were not of sufficient length. Even the 40-feet swim which the Government recently recommended is, to my mind, still unsatisfactory, since the cattle, when once accustomed to being dipped, make a long spring and so evade a good deal of the swim. To make the tank much longer would necessitate more dipping fluid, and dipping would be more costly for that reason. With a view of improving the matter I think it would be an improvement if, when constructing a tank, a round tank were introduced about midway of long tank which would enable the long tank to be made much shorter. There would be the ordinary plunge, and as soon as the bullock found itself in the water he would swim into the round tank where he could be kept swimming as long as necessary.

Of course I am aware of the fact that dipping would not be carried out quite as expeditiously, but certainly better dipping would result, and after all I take it that that is what we aim at. I trust others will give their views.—Yours, etc.,

Contat, C.P. J. E. CONTAT.

LIME-CLOGGED PIPES—CAUSTIC SODA REMEDY.

To the EDITOR of the *Agricultural Journal.*

SIR,—My attention has been drawn to a query in your correspondence pages in the August issue of your *Journal* having reference to the clogging with lime of pipes and the means of getting rid of this deposit. I note your reply to the query, and would like to supplement it with the information that there is quite an easy means of dissolving out the lime, namely, by the use of caustic soda.

It will be necessary to take the piping length after length and insert it into a pipe of larger diameter, which is plugged at one end and filled with a strong solution of caustic soda. So if it is a 1-inch pipe which is clogged use, say, a length of 2½-inch pipe, plug it

at one end well, place it on the slant, fill it up with the solution, and insert the clogged pipe and leave it there till the lime is dissolved out.

If it is possible to continually circulate, by pumping the solution through a pipe line, the time for dissolving is considerably shortened.

The above method has been found to give good results.—Yours, etc.,

O. NICOLAYSEN,
of Malcomess & Co., Ltd.

Bloemfontein, September, 1911.

P.S.—I would like to mention to your correspondent that if his pipes are uncovered and lying on the open ground, the deposit of the lime takes place much quicker than if the pipes are buried. The action of the heat applied by the sun drives off the carbonic acid gas, which holds the lime in solution, when the pipes are uncovered. When buried, this action is to a great extent diminished, and the deposit takes place at a much slower rate.

SMUT IN WHEAT, BARLEY, ETC.

To the EDITOR of the *Agricultural Journal.*

SIR,—In reply to Mr. S. T. E. Meaker's letter on the above subject in the August *Journal,* I wish to state that I have used bluestone with great sucess for very many years, and look upon it as a perfect preventive for smut, provided, of course, that the method adopted is correct, and that the bluestone used is pure, and not the very crude article which is often passed off as a substitute.

Take one pound of pure bluestone, grind to a powder, place in a wooden or earthenware vessel, add about six bottles of water (hot water will facilitate the mixing), empty one bag of wheat into large pot or tub, pour the mixture over the wheat and stir thoroughly by hand or use a spade, till all the wheat is wet. No water should remain over in tub after wheat has been removed.

Sow at once, or it may remain over for days, providing that it is in the open.

Bluestone used as above I will guarantee as a perfectly reliable preventive against smut.

Narrow Vale, Ugie, East Griqualand, C.P. W. A. HART.

WARTS ON HEIFERS.

To the EDITOR of the *Agricultural Journal.*

SIR,—In the September issue of the *Journal* I observe a letter by Mr. W. Falconer Smith requesting your readers to suggest some remedy for warts on heifers. In reply I wish to state that I have found Quibell's Fluid Sheep Dip very effective in curing same.

On two different occasions have I cured heifers which were very badly infected with warts. I simply painted the pure dip on to the affected parts once or twice and the warts completely disappeared.—Yours, etc.,

Frere Station,
Natal, 23rd September, 1911.

JAMES J. HARDING,
Acting Stock Inspector.

SELF-SUCKING COWS.

To the EDITOR of the *Agricultural Journal.*

SIR,—Some time ago I noticed some correspondence on the unsuccessful methods which had been tried for preventing a milk cow sucking herself. I have succeeded with the following dodge:—

I tied a piece of strong carpet binding round the cow's body, just behind the shoulders, to which I attached two pieces of light rope (one on each side) about where saddle D's would be. The other ends of the rope I attached to the tips of her horns by means of wire and gimlet holes, thus forming a pair of reins. To prevent the rope slipping over her hump, I attached them loosely together under her neck by a piece of string. Just sufficient slackness should be allowed to enable the beast to feed. This has been successful for three weeks, and I have every hope of effecting a cure. It is certainly a preventive.—Yours, etc.,

A. FLOWERS.

Umga Flats, P.O. Longdens, via Ugie, 6th September, 1911.

"SCHLOSS'" PATENT OX HARNESS.

To the EDITOR of the *Agricultural Journal.*

SIR,—Could any of your readers say whether they have tried "Schloss'" Patent "Hercules" Ox Harness? Is it an improvement on yoke and skey—in fact, is it what it is claimed to be in the advertisement?—Yours, etc.,

Roberts Heights, 25th September, 1911. A. G. G. MYLREA.

Questions and Answers.

These pages will be devoted to questions, and an endeavour made to reply to all inquiries upon agricultural topics of general interest, or concerning any of the articles published from time to time in the *Journal*. In all cases replies will be posted to correspondents so soon as same have been procured.

Correspondents are requested to write on one side of the paper only. No manuscript will be returned.

All letters must be addressed to the Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria.

HYACINTH BEAN (*DOLICHOS LABLAB*).

B. Prescott, P.O. Marula Siding, Rhodesia, writes:—I am enclosing a bean I brought down from the Congo country. I have not seen it eaten, but stock and donkeys are greedy for the leaves, of which it bears a great quantity. Nothing seems to affect it, as frost or drought; and eaten down to the ground, it springs year after year from the old roots. Can you kindly let me know what bean it is?

Answer.—The Government Botanist (Transvaal) replied that the bean sent was the Hyacinth bean (*Dolichos lablab*), a bean which has proved excellent as a hay-crop at the Botanical Experiment Station, Skinners Court, Pretoria. The young pods make an excellent vegetable.

WOOL QUERIES—INFLUENCE OF CLIMATE.

"South Australian" writes:—Can Mr. C. Mallinson give please the following information: (1) I have a small flock of large-bodied, plain, light woolled merino ewes, medium to strong wool, with very little grease. At twelve months the wool fetches up to 9d. a lb. The ewes appear to be of Rambouillet type. To these I mated last year Rambouillet rams, and this year imported South Australian strong-woolled rams from Steiger and George III blood. I wish to continue using South Australian rams from the same stud, but I find their wool, though fairly dense and lustrous, is very deficient in yolk and inclined to be dry and white. During the winter this does not appear to affect the exterior of the fleece, but in the heavy rains and heavier mists, I notice the exterior of the fleece on all my sheep appears mottled, though inside it looks very fair. I do not know the rainfall, but should think average about 40 inches, with mists about 150 days in the year. The altitude would be from 4000 to 5000 feet in various parts of the farm. Does Mr. Mallinson think that in these circumstances I am well advised to continue in my endeavour to breed up a good stud of South Australian type strong-woolled sheep, and will the climatic influence, aided by judicious mating, help to give the sheep more yolk to withstand the mists, or will the type I am aiming at (a medium-sized, medium to strong woolled animal) deteriorate through adverse climatic conditions? Or, briefly, can a medium to strong woolled sheep be successfully bred in a misty climate, and can you introduce enough yolk, and still have a strong woolled sheep? I find in this country the stronger the wool, the less yolk. (2) Why do you more often find a whitish pink skin in a light yolked strong woolled sheep than in a greasy one in South Africa? (3) Is it advisable or possible without detriment to ewes and progeny to put rams to ewes two to two and a half months after last lambing, in order to change the time of next lambing to a more convenient time?

Answer.—Mr. C. Mallinson, Flockmaster and Wool Expert, Transvaal, replied:—If you are thoroughly convinced that your ewes are of the Rambouillet type you should have bought Wanganella rams showing a fair amount of yolk. I don't think you will be able to infuse sufficient yolk into your flock by using the Steiger and George III blood which you imported from South Australia last year. If you do it will take a good many years, as they are naturally dry woolled sheep. It is a great pity you did not import rams of the Murray blood from South Australia, showing a fair quantity of yolk, instead of the Steiger and George III blood. You would then be in a good way to grow the type of wool you want. If your sheep are Rambouillet blood, as you said before, you should have introduced Wanganella blood as I don't believe in mixing breeds. If your sheep are of the large type, and of no particular breed, but of mixed blood, either the Wanganella or the Murray breed of South Australia would do what you want. In regard to your rainfall I might tell you

that 40 inches is rather much for merino sheep. There is nothing to stop them from getting weather stained more or less with that amount of rain on them. The deficiency of yolk or dryness of wool will be one of the points you will have to fight against. You say: "Does Mr. Mallinson think that under the circumstances I am well advised to continue in my endeavour to breed up a South Australian stud of strong woolled sheep?" Let me tell you that you did not import what I call a South Australian sheep. What is understood by a South Australian sheep in Australia is the Murray blood of South Australia, and not Steiger and George III blood. Your climate will certainly not give them more yolk than what keeps it healthy. One of the points you will have to fight, by classing and judicious mating, is to keep up a sufficiency of yolk. Of course I am rather at a disadvantage writing in this strain not knowing your country, only what I can gather from your letter. I can't say that it has been my experience the stronger the wool the less yolk, that is when I have been trying to breed for more yolk. (2) A pink skin is the right colour for a healthy sheep. When it becomes white it is a sign of it being sick. (3) I don't think it is advisable to put rams to ewes two to two and a half months after lambing without doing injury both to ewes and lambs. Why not change the lambing gradually?

TREE LUCERNE.

In reply to an inquiry by C. S. Erasmus, P.O. Carnarvon, Cape Province, with regard to tree lucerne (*Medicago arborea*), the Government Botanist (Transvaal) wrote:—This plant is being grown experimentally at the Botanical Experiment Station, Skinners Court, Pretoria, but so far we have not been able to give it a feeding test, as growth has been slow. It keeps green in winter and is a promising shrub for further investigation, but up to the present we have not been able to demonstrate that stock would eat it. In view of reports received from other countries to the effect that stock would not care for it on account of a certain bitter taste, we consider it wiser to give it a more extended trial before recommending farmers to plant it.

POULTRY BREEDING PENS—BEST BREEDS FOR TABLE AND EGG PRODUCTION.

J. J. van der Merwe, Ladybrand, Orange Free State, writes:—Poultry keepers advertise pens for pullet or cockerel breeding. If correct, how is this done? (2) What are the best breeds (*a*) for the table; (*b*) for egg production, with an eye to the Johannesburg market?

Answer.—The Poultry Expert (Transvaal) replied:—The term "pullet breeding" and "cockerel breeding" pens does not mean that these pens will produce either all pullets or all cockerels, but rather that the pullet breeding pen has been mated up for the purpose of breeding good pullets for exhibition purposes, and the cockerel breeding pen with a view to breeding good cockerels for show purposes. This is termed "double mating", and it is only adopted by poultry keepers who breed birds for show purposes. (2) The best table bird is the Indian Game, but if breeding table birds for market purposes a cross between the Indian Game-Wyandotte, Indian Game-Orpington, or Indian Game-Plymouth Rock will give you very good results. With regard to the best laying breed, this entirely depends upon strain. There are good laying strains of most breeds, but I prefer the White Wyandotte, Buff Orpington, White and Black Leghorns, and Anconas as egg-producers.

PLOUGHING AND SOWING QUERIES.

W. C. Thomas, 41 Main Road, Beaconsfield, Cape Province, intends starting farming, and asks for advice on the following points:—(1) *Re* ploughing up new land for mealies, kaffir corn, or wheat; what depth would you advise ploughing? (2) By which method would you propose sowing the above seed: broadcast or by mealie planter? If the latter, what depth should the seed be sown with the planter; and what make of planter would you advise? (3) Suppose I should start ploughing in, say, January or February, would it be beneficial for this ground to lie until June for wheat, or until September for mealies? If not, what is the best time to start ploughing so as to have a big land ploughed up with only a limited supply of oxen, and then have it ready for the planter?

Answer.—The Acting Government Agriculturist (Cape) replied:—(1) One cannot reduce to a hard and fast rule the depth to which new land should be ploughed. It is a pretty safe rule to plough as deeply as you can. (2) I would certainly advise planting mealies and kaffir corn by means of a mealie planter, as this will enable you to cultivate in between the rows. The depth would be from three to four inches. Most of the agricultural machinery firms supply good mealie planters. I would recommend you to write to Messrs. Phillip Bros., Port Elizabeth; Messrs. Griffiths & Co., Port Elizabeth; and

Messrs. Malcomess & Co., East London, for catalogues of their planters. (3) The answer to this question depends on so many local conditions that it is impossible to give a definite reply from here. In a dry climate it would be very much more beneficial to the mealie crop were your land to be ploughed in January or February, and, instead of being allowed to lie until, say, October, if after each rain it were cultivated so as to save as much as possible of the rain falling in the meantime.

COTTON CULTIVATION.

Henry A. Kieser, Box 2435, Johannesburg, asks for information on the following points:—(1) Which district in the Transvaal is most suitable for cotton-growing? (2) What is the price of ground in the district you favour? (3) What is the earliest date one can plant in that district? (4) Does the Government give any assistance to those who wish to start cotton-growing? (5) Will cotton grow successfully on new ground, i.e. ground that has been ploughed for the first time. (6) What is the best literature on cotton-growing?

Answer.—The Chief of the Division of Tobacco and Cotton replied:—(1) The Rustenburg District has given splendid results for the past two years. Very good results have also been obtained in the low country districts of Zoutpansberg and Barberton. (2) Land will range in value from 5s. up to several pounds per acre, depending on the location. (3) Planting should be done as early as possible, immediately after the rains set in. This is usually about the 1st of November. (4) Government will give advice as to cultivation and handling the crop, and will furnish seed at 3d. per lb. and will endeavour to gin the cotton, making only a small charge to cover expenses. (5) Where the new ground has been ploughed early it should give a crop of cotton, though if possible it is probably better to plant mealies the first season. (6) A good practical work on cotton is "The Cotton Plant", published by the United States Department of Agriculture, Washington, D.C., also "Cotton", by Burkett, which you could no doubt procure through local booksellers.

BREEDING POULTRY.

G. R. Healy, P.O. Newington, via Komatipoort, writes:—About four years ago I started with kaffir fowls, and from about 100 good birds selected fifteen, principally for size. To these I put Black Orpington cocks, and last year crossed the best of their progeny with a Buff Orpington. From this cross I have got fifteen hens, which, during the last six months, have given an average of nine eggs per day, many of which weigh 2¾ oz. and are nearly all over 2 oz.—the average, I should say, is from 2¼ to 2½. They are very large birds, and, judging from what I have read about poultry, they seem to be above the average, both as egg layers and as table birds. I would be glad of advice as to how I should continue breeding. I have incubated nearly 200 chicks from these birds, using as cocks their father and one of his male progeny. Now, would you advise me to select from these chicks the best of the pullets and a few cocks, or should I import new blood? And, if the latter, what breed? The conditions here are, I think, favourable to poultry, the ground being very dry with a lot of lime. The laying hens have a free range, and for the last two years I have never allowed the number to exceed thirty. Young chickens, etc., are kept in movable houses about a quarter of a mile away on the veld with free range during the day. The food is scalded meal in the morning, and kaffir corn, mealies, or millet at night. The last capon I killed weighed, after being cleaned, over 8 lb. This is the only one I have weighed, but though a good bird was not, I think, the largest I have had.

Answer.—The Poultry Expert (Transvaal) replied:—I am glad to see that you have obtained good results from your birds, for you have been working on the lines advocated by me some five or six years ago. I would advise you to use one other pure-bred cock on the fifteen hens and the selection of this will depend on what you require. If you still wish to keep size I think that a Plymouth Rock cock of good laying strain would suit you. The progeny of this cross should be mated with a Black Orpington cock, and the year after you can use a Buff Orpington cock on the progeny of the Black Orpington. By all means select the best of your pullets every year for stock purposes and do not breed from the mob, but from the best only.

BREEDS OF PIGS FOR BACON FACTORIES AND JOHANNESBURG MARKET.

J. J. van der Merwe, Ladybrand, Orange Free State, asks what kinds of pigs are required for (1) the bacon factories and (2) the Johannesburg market.

Answer.—The Acting Superintendent of Dairying replied:—In breeding for bacon, I think a cross between a Berkshire boar and a Tamworth sow, or Berkshire boar and Middle White (Yorkshire) would be very suitable for bacon production. The Large Blacks are also very good and are well suited to this country. Either of the above would be suitable for the Johannesburg market.

BEST BREEDS FOR CREAM PRODUCTION.

J. J. van der Merwe, Ladybrand, Orange Free State, asks :—What do you consider the best breed for cream production, combining at the same time body ? What cross-breed would be the best, and where could same be obtained ?

Answer.—The Acting Superintendent of Dairying replied :—The best all-round breed for cream production is the Jersey, then also the Ayrshire and Shorthorns are typical dairy breeds. With either of the above breeds you would lose in body. As you require to produce cream and at the same time to retain size, I do not think you could do better than go in for Friesland-Afrikander or Shorthorn-Afrikander crosses. With either of these crosses you retain body, whilst at the same time the quality of the milk is sustained by the infusion of Afrikander blood.

BEST BULL FOR MILKING STRAIN.

The Managing Director of the Ostrich Feather and Produce Agency, Ltd., Port Elizabeth, writes :—We have recently acquired a herd of mixed cattle, mostly of the Friesland type, with which we are farming on the Port Elizabeth (Van Staadens River) coast belt. We would like to know the best bull to breed from, so as to obtain a good milking strain, as well as big bullocks.

Answer.—The Acting Superintendent of Dairying replied :—I am inclined to think that a good pedigree Friesland bull would suit your purpose the best, as Friesland cattle appear to do better in coastal belts than many other breeds. A good Shorthorn, Lincoln Red, or Afrikander bull would also be a suitable cross, but in my opinion would not do so well in your part of the country.

SOUTH DEVON CATTLE.

A. K., P.O. Fort Brown, Cape Province, asks for the names of breeders of South Devons, and proceeds :—What is the difference between the South and the North Devon ? Are the South Devons red ? Which would you recommend to cross with the half-bred Afrikander ?

Answer.—The Acting Under-Secretary for Agriculture, Orange Free State, replied :—Messrs. Grepe Bros., Reddersburg, Orange Free State, and B. T. Bourke, Vierfontein, Orange Free State, are breeders of South Devon cattle. Compared with the North Devon, the South Devon is large, coarser in bone, and not so uniform in type. The latter are red in colour, but of a lighter shade, and the hair is short and smooth as compared with the thick curly coat of the typical North Devon. The South Devon is a heavier milker than the North, and furnishes a heavier ox. Where greater size and more milk is desired the South Devon seems better suited for crossing on Afrikander cows. For hardiness and uniformity the North Devon is to be preferred.

APICULTURE—QUEEN FROM LAYING WORKER EGG.

E. J. Brown, Cape Province, asks :—Can any of your expert bee-men tell me if they can say if they know of laying worker eggs producing queens ? Or, put it in another way, when a colony with laying workers only (no queen) have ultimately produced a queen in the usual cell, was it from one of the laying worker's eggs ?

Answer.—Mr. H. L. Attridge has kindly supplied the following reply :—So far as is known at present eggs laid by workers can only produce drones ; this also applies to unfertilized queens. Cases have been known where it has been difficult to account for the presence of a queen in a hive previously supposed to be queenless, and the inference is that an egg or eggs have been purloined from a neighbouring colony. I have referred to this in " South African Bee-Keeping ". No doubt hives are frequently thought to be queenless, simply because the queen is not to be found even after two or three inspections at close intervals, and the absence of eggs and young brood at the time tends to confirm this supposition. However, this alone is no absolute proof of queenlessness ; cessation of egg-laying for a time, although abnormal, when adjoining colonies have an abundance of brood, is not an altogether unknown condition of things. Cases have been brought to my notice which, on the face, looked very much like the transportation of eggs ; but on obtaining further particulars, the following becomes the true explanation. On the decease of a queen, laying workers are prone to establish themselves, which is characteristic of South African bees. Now, it sometimes happens that an examination of a hive is made a few days after the death of a queen, when the fact is established that a laying worker is in possession, this being apparent from the way in which the eggs are deposited. Now, by an oversight at this inspection, the bee-man misses the only queen cell, which was raised at the last moment in some out-of-the-way corner. At a subsequent examination, say after two or three weeks, he discovers a young queen, and at once concludes that the queen has been raised from one of the laying worker's eggs. I do not say that you have fallen into the error, but it is one explanation, and I know it to be a common mistake.

PASTURE GRASSES.

M. Schwartz, Ermelo, writes :—I have a farm, "Spion Kop", Davel District, of about 1200 morgen in extent. I would like to put the farm under tall fescue, to enable me to have sweet and green grass the whole year round for dairy purposes. Do you recommend this grass, or is there anything better? If you do recommend this, will you kindly advise me how to prepare the ground, and what quantity per morgen would be required. Some farmers say I should mix with other kinds; what do you think? Will this grass want renewing, or will it last perpetually? Or again, would you advise me to sow different seeds on other portions of the farm? Will these new grass seeds be an improvement on the South African grasses?

Answer.—The Government Botanist, Transvaal, replied :—New Zealand tall fescue (*Festuca arundinacea*) is the best winter grass we have yet tested in South Africa, and I can confidently recommend it. A mixed pasturage is preferable to a pure stand, as it gives the animals a change of diet. We have had too little experience as yet with pasture mixtures in this country to say definitely which mixture will give the best results, but I would recommend you to try the following :—Tall fescue, 20 lb. per acre; smooth bromegrass, 5 lb. per acre; rescue grass, 5 lb. per acre; chewings fescue, 5 lb. per acre; lucerne 1 lb. per acre; burnet, 2 lb. per acre; white clover (*Trifolium repens*), 2 lb. per acre—total, 40 lb. This is a perennial mixture which keeps green all winter. On part of your farm you might sow paspalum grass, but do not on any account mix paspalum with the above mixture. Paspalum will add greatly to the value of your grazing, and will enable you to carry many more head of stock than if the farm is left to ordinary veld. But paspalum does not keep green in the middle of winter on the high veld. Ten pounds of seed per acre (70 x 70 yards) is all that is required for paspalum, as the seed is light. The ground must be thoroughly ploughed, cross-ploughed, and harrowed down to a level, fine tilth before sowing to grasses. If you can arrange to have it steam-ploughed so much the better and quicker will it be done. The seed should not be sown till the steady rains come.

SUGAR-BEET CULTIVATION.

L. C., Marico, asks whether there is any market for sugar-beets, also what is the average yield per acre, and what is the best time to sow and how sowing should be done.

Answer.—The General Manager, Experiment Farm, Potchefstroom, replied :—Experiments have proved that the crop can be grown in this country, and that it is of very good quality, but there does not exist a demand for beet for the manufacture of sugar, while for stock-feeding purposes mangels are recommended as a more profitable crop. You will find particulars in regard to the growing of mangels in the October, 1904, number of the *Transvaal Agricultural Journal*. Beet is grown in the same way, but the plants are left a little closer in the rows and there is no necessity to take any special precautions for their protection against frost.

PLOUGHING IN POT-CLAY SOIL—RATIONS FOR LABOURERS.

B. B. Burger, Palmietfontein, P.O. Taaibosch, Cape Province, asks :—(*a*) Can you or one of your readers inform me what kind of plough would answer best in pot-clay, and where such a plough is to be got? The soil of the lands on this farm consists of black pot-clay, and the ground sticks to the plough in such a manner as to make ploughing very unsatisfactory. So far, a plough with a straight razor beam has been found to answer best, as, for instance, the Oliver and the old pattern of Howard Bedford. (*b*) I should also like to know what the law says on the subject of rations to be given to labouring natives on a farm; how much has to be given per day or per month, according to the usage with us farmers?

Answer.—The Acting Government Agriculturist (Cape) replied :—(*a*) The type of plough to be used depends very much on the degree of stickiness of the soil to be worked. A plough with a deep or rather perpendicular mouldboard like any of the well-known types of digging ploughs, as you are probably aware, has the effect of breaking up the soil in the operation of inverting the furrow slice. This type of mouldboard, which is responsible for pulverizing fairly dry soil so thoroughly, has the effect in soil with much moisture, and of a clayey nature, of puddling it, the set of the mouldboard having the effect of packing the soil, and naturally, as there is more direct resistance, the likelihood of soil adhering to the mouldboard is also increased. The type of mouldboard, therefore, most suited to a soil like pot-clay would be one which will not pack, and will offer only a little resistance to the soil in the actual turning over process. This type is a somewhat longer mouldboard, with the breast running almost parallel with the beam, and with a curve not so pronounced as the ordinary run of general-purpose ploughs on the market. I may say that most implement firms can supply you with a plough for a special purpose, and it would be invidious to recommend any special plough. I might also add that disc ploughs are able to do very heavy work. (*b*) With regard to rations to labourers, this is not governed by law, but by agreement and local custom.

BEST BREEDS OF PIGS—CONSTRUCTION OF STYES.

P. Bradbury, Government School, Benoni, asks for information as to the best breeds of pigs, with prices, and particulars as to construction of styes.

Answer.—The General Manager, Experiment Farm, Potchefstroom, replied:—The best breeds for the high veld appear to be the Berkshire and the Large Black; the former is a good breed for raising "porker" pigs, i.e. for killing at 100 to 120 lb. weight, but the Large Black is preferred for bacon purposes. Pure-bred pigs are scarce and dear; from £4 to £10 each for good young pigs for breeding purposes is common. At the next annual sale of stock, which takes place on this farm on 1st November, about eighty young pigs of the two breeds mentioned will be sold. In regard to styes, if you will let me have full particulars of the number of pigs you intend to keep, and what character of buildings you are prepared to erect, I shall be pleased to send you sketch plan, which may be of some assistance to you. No leaflets have been published dealing therewith.

OSTRICH CHICKENS SUBJECT TO CONVULSIONS.

P. L. Grobbelaar, Kalkfontein, Rooispruit, via Rosmead, Cape Province, writes:—(1) I have an ostrich here that produces chickens subject to convulsions. At first they seemed to be too fat, and so I put them in a dry camp, and fed them on dry forage, but with no avail. The chickens take a longer time to hatch than other chickens do, and when hatched some have yellow bellies, others blue, whilst some appear normal; but they always look about in a convulsionary manner, and sometimes shake. They are weak and refuse to eat, eventually dying. My three settings have all of them hatched, but I have not got a single bird yet. The last time the female had been running with a brother of her former mate, and both of the males had already produced chickens with other females, but with this one they produced none. Would the female perhaps cross with another breed? Both of the birds have strong blood. Is this perhaps the cause? Kindly give me some advice on the subject. (2) I have also got a young male ostrich that is losing all his white feathers. When he arrived from Oudtshoorn I put him in a lucerne camp. In three weeks' time his white feathers appeared. When they had grown to the length of three inches they began to fall out, and now there are but a few left. In some of the feathers a blood clot forms, and the feather becomes dry just below this blood clot, and then falls out. The bird is fed on nothing but green lucerne. Is the blood too soft, or is it lacking in growing power? The bird is only thirty months old, and has not been sitting yet.

Answer.—The Farm Manager, Grootfontein, Middelburg (Cape), replied:—(1) It would appear that the hen has some constitutional weakness or is perhaps closely related to the two cock birds. It would be best to mate her with a cock bird not related to the other two cocks or to herself and await the result. (2) With reference to the male bird that has lost all his white feathers, it seems almost as if the bird may have been ill or had some slight fever, but I have had one rather similar instance where the bird had not had very good treatment and not sufficient nourishing food and no bones. Birds growing feathers should have as much crushed bone as they can eat.

DISC PLOUGHS *versus* MOULDBOARD PLOUGHS.

R. S. Chester, Heilbron, Orange Free State, writes:—A neighbour of mine informs me that for the past two years he has been ploughing with a disc plough and a mouldboard plough, both of good recognized makes, acre by acre—that is, disc in the first acre and mouldboard in the second and so on. He says that the acres turned over by the disc plough have given such a poor return that this year he intends not to use that plough in future. His figures are, 64 per cent. bags of cobs to the mouldboard plough, the balance, 36 per cent., to the disc. Have any of your readers had a similar experience, and can any one explain it? The man is an experienced and successful farmer.

Answer.—The General Manager, Experiment Farm, Potchefstroom, replied:—I have not heard of any other case in which the discrepancy between the yields from mouldboard and disc ploughing was so great. Indeed I would be inclined to think that it is due to some other reason than the ploughing. It is, however, possible that the disc ploughing may have been badly performed, or the fine tilth which is often found after disc ploughing may not have suited the particular soil under consideration. On certain soils a tilth may easily be made so fine that when rain falls the land "runs together" or becomes "set"—thus injuring the growth of the crop. Speaking generally disc ploughing is becoming increasingly popular during winter when the soil is hard and dry, but mouldboard ploughs are generally used at other seasons.

GREEN FLY ON PEACH TREES.

P. Milward-Bridges, "Newlands", 52 Seventh Avenue, Bezuidenhout Valley, Johannesburg, asks :—Will you be good enough to give me a certain cure for green fly on peach and rose trees. I have tried Bordeaux mixture, sulphate of copper and ammonia, copper carbonate, nicotine water, and a wash made with tobacco, soft soap, paraffin, Condy's fluid and water, 1 in 10, boiled, yet I still have plenty and to spare of the pests. In addition to the above I have syringed the trees frequently with soap suds, and sprinkled tinder ash on and under, also soot.

Answer.—The Acting Chief of the Division of Entomology, replied :—You certainly have tried enough substances against the peach aphis, and amongst them have been as good aphicides as I know of. I recommend you to try "nicotine water" again. Home made preparations from tobacco are generally unreliable, and I suggest that you get a "tobacco extract sheep dip" of good reputation and to use it at the strength of one part to seventy-five of water. You must use it plentifully and apply it with a pump throwing a forceful continuous spray. A syringe is unsatisfactory for the purpose. The sooner the pest is tackled after it begins to show, the easier it is subjected, but several thorough sprayings are likely to be necessary even if you begin without delay. It is best to use a dip of known strength of nicotine if you can get one. It is the nicotine that counts and this should be present to the extent of at least one-tenth per cent. in the diluted wash.

A. S. Gibson, P.O. Box 12, Maraisburg, Transvaal, writes :—Will you please send me a recipe for the cure of green fly on my peach trees, giving me the exact formula for the mixing of same. This pest seems to threaten my orchard even more than it did last year, when I scarcely got any crop from over 1200 trees.

Answer.—The Acting Chief, Division of Entomology, replied :—This Division has not made a special investigation of the green fly pest of peach trees, but the best remedy known to me is that of frequent spraying with a tobacco extract sheep dip. The strength of about one part of tobacco to seventy-five parts of water should be used and great care should be taken to get a brand of extract that has a well established reputation for reliability as a sheep dip, and not one which has a low and uncertain percentage of nicotine. A good brand should contain upwards of 8 per cent. of nicotine. The extract should mix fairly easily with a small quantity of water and it may then be stirred into the bulk of water in the spray tank. It should only be mixed as required for spraying as when left exposed it gradually loses strength. The spraying should be done very thoroughly and with considerable force, and as I have already intimated a number of applications may be required.

STREAKINESS IN BUTTER.

G. W. Lund, Bosberg, P.O. Box 58, Aliwal North, Cape Province, asks :—Will you kindly inform me how to prevent whitish marble spots in butter? I lived for some years in the peninsula near Capetown and got all my butter from the district of Rouxville. The supplier of the butter had a good cream separator and churn. The cream is kept in enamel buckets till it is ripe for butter-making, after preparation the butter is packed in neat 1 lb. parcels and despatched. The butter has a good taste and finds a good market, but upon cutting through the parcel there are sometimes to be seen whitish marble stains and one would think that it has not been handled with cleanliness, which I am sure is not the case. New Zealand butter does not taste any better and yet it has no stains.

Answer.—The Acting Superintendent of Dairying replied :—Streaky butter is a very common fault and usually consists of salty or caseous streaks, or a combination of both. Impure salt unevenly distributed through the butter is usually the cause of what are known as salt streaks. The best method of remedying streaks of this nature is to work the salt into the butter and then allow same to remain for an hour or two when it should be reworked. Caseous streaks which are known by the white mottled appearance of butter are often in the form of white specks. This may be caused by excessive ripening of the cream which causes the precipitation of the casein which becomes incorporated in the butter in a hardened form and appears afterwards in the form of white specks. Exposing cream or butter to sunlight or a very strong light, bleaches the colouring matter, and if this takes place in patches, it will give the butter the appearance of being streaky. Failing to wash all the buttermilk out of the butter prior to salting, the salt having the effect of hardening the casein thus has a tendency to produce mottling. When cream contains an excessive

amount of milk and is allowed to ripen too much, caseous lumps or curdy matter are formed by the excessive acidity and this is difficult to remove in the subsequent washing of the butter and later appears in the form of white specks. When cream of this nature is churned, the best method is to first strain the cream through a coarse cloth and then wash the butter thoroughly when in a granular state. I am not aware if a butter worker is used, if not I would advise doing so, as in this way butter can be more thoroughly and evenly worked and streakiness is less likely to occur.

Notes on the Weather of August, 1911.

TRANSVAAL.

Observers' Notes.

SUMMARY.—The month has been comparatively dry, the rainfall having been below the average in all but the south-eastern and Lichtenburg Districts. The season's (two months) rainfall, however, shows an excess in all but the north-western and central southern districts, where there exists a slight deficit. The excess is most pronounced along the south-eastern border.

In the Wakkerstroom District 7 inches of snow fell during the 26th and 27th, and this was followed by very hard frosts which completely destroyed the fruit tree blossoms.

BARBERTON DISTRICT—

Cairn Siding.—Unusually low temperatures were experienced this month: frost occurred in low-lying places on the 27th, 28th, and 31st. (T. S. Watkinson.)

BETHAL DISTRICT—

Leeuwkuilen.—The month has been an exceptionally good one for the time of the year, although on the 5th and 6th bitterly cold weather was experienced, and a few drops of rain fell; from 6 to 8 degrees of frost were registered by the ground thermometer between the 27th and 30th, which, I think, has done great damage to the peach crop in prospect, as practically all the peach trees on the high veld were in full bloom. From the 7th to the 25th we had quite summer weather, with a few mists in the early mornings. At 9 a.m. on the 26th rain commenced to fall, and between 1 p.m. and 5 p.m. no less than five hailstorms occurred. The grass is shooting out fast, and points to an exceptionally early spring. (W. J. Wayland.)

CAROLINA DISTRICT—

Waterval Boven.—The weather was very changeable; at the beginning of the month it was warm, and towards the end very cold, especially the last week. (H. C. Borcherds.)

LYDENBURG DISTRICT—

Belfast.—Frosts were recorded on twenty-four mornings by the grass minimum thermometer; the hardest frost was on the morning of the 10th, when the thermometer stood at 13°·1. Rain appeared to be very local, as the majority of thunderstorms passed round this station. The weather got very cold again at the close of the month, and frosts, where the fruit blossoms were well advanced, will tell considerably on the crop. (G. J. Imrie.)

Graskop.—Taken on the whole, August has been a cold month, and the weather very changeable. Mists and frosts have been prevalent, and thunder has been heard several times. (G. Irvine.)

MIDDELBURG DISTRICT—

Middelburg.—The strong winds filling the air with dust and so characteristic of the month here as a rule, have this year been conspicuous by their absence. The month has been an unusually cool one; rain, though often threatening, has fallen but a few times, and then in but a small amount. Fruit trees are in full bloom, the grass everywhere greening up, and the season of spring entered upon. (Dr. H. A. Spencer.)

WATERBERG DISTRICT—

Rhenosterpoort.—Very sharp frosts have been experienced during the last few days of the month, which have done a great deal of damage to crops—farmers report the whole of their wheat and oat-hay killed by it. On the 26th a very cold rain, accompanied by hail, was experienced on the farm Rhenosterpoort, about 17 miles to the east of this post, and as there was sharp frost on the same night a great deal of damage was done. (Const. S. Salter, T.P.)

NATAL.

An unusually heavy snowfall, remarkable both for its extent and persistence, occurred in Natal towards the end of August. Unfortunately, owing to the limited arrangements for securing reliable meteorological records in the country districts, no very accurate particulars of the course of the storm or the depth of snowfall can be given, still its general direction and extent may be gathered from some of the observations that were made. The earliest reports of snow came from the Polela district, in which it began to fall at 7 p.m. on the 25th at Himeville and at 8 p.m. at Bulwer, continuing for well over twenty-four hours at each place. The next report is from Mooi River, slightly N.N.E. of Bulwer, where snow fell from 10 p.m. on the 25th, continuing well on into the 26th, but at Newcastle, which is almost due north of Mooi River, it did not begin till 7 a.m. on the 26th, or at Ladysmith till 11.40 a.m. The general trend of the storm may thus be taken as having followed a line east of the Drakensberg in a northerly direction. This, however, was not its full extent, as snow fell heavily at Greytown and Nkandhla, both N.E. of Bulwer, and throughout the greater part of the Northern Territory.

A general lowering of the temperature throughout the Province was recorded on the 25th and 26th and the succeeding days, with rain in the districts in which there was no snow; and this comparatively cold snap was noticeable even at the Coast stations, Stanger, Durban, and Port Shepstone, while frosty weather followed in the upland districts, lasting for two or three days.

A table of the recorded readings at various stations is added for the purpose of comparison.

Station.	Height above Sea-level (approximate).	Minimum Temperature. 25th.	Minimum Temperature. 26th.	Minimum Temperature. 27th.	Precipitation. 25th.	Precipitation. 26th.	Precipitation. 27th.	Remarks.
	Ft.	F.	F.	F.	Ins.	Ins.	Ins.	
Himeville ...	—	41	30	30	—	·45	·72	Snow, 7 p.m. 25th to 8 p.m. 26th.
Bulwer	5100	40	31	31	·75	·41	—	Snow, 8 p.m. 25th to 10 p.m. 26th.
Richmond ...	2810	47	35	37	1·37	·62	-	Snow on hills, 26th.
Lidgetton ...	3950	30	30	24	1·11	·51	—	Snowstorm, 25th.
Nottingham Road .	4850	33	30	22	—	·97	—	Snowstorm, 26th.
Ladysmith ...	3280	54	37	33	·94	·60	—	Sleet, rain, and snow, 26th.
Newcastle ...	3890	49	30	30	·45	·75	—	Snow, 26th.
Vryheid... ...	3860	49	33	31	—	·50	1·00	Snow, 26th.
Paulpietersburg ...	—	45	38	36		·43	·76	Snow, 25th: hills covered, 26th.
Mpofana ...	—	44	39	34	—	·72	·96	Snow on hills, 26th.
Pietermaritzburg...	2250	50	39	39	·95	·32	—	
Howick... ...	3450	38	38	28	·98	·41	-	
Estcourt ...	3830	43	43	43	·60	—	·60	
Dundee... ...	4100	48	35	33	—	·50	·86	
Greytown ...	3410	45	32	36	—	2·45	—	Snowstorm, 26th.
Krantzkop ...	—	31	33	37	1·02	·90	.	
Mahlabatini ...	—	37	35	43	·82	1·42	—	
Melmoth ...	—	52	41	39	—	·77	·94	
Empangeni ...	210	48	46	45	·36	1·18	--	
Stanger... ...	150	46	47	50	·68	·60	—	
Durban... ...	260	59	48	50	·03	·52	·18	
Port Shepstone ...	60	47	49	51	·75	·06	-	

Rainfall for August, 1911.

CAPE PROVINCE.

CAPE PENINSULA :	*Inches.*
Royal Observatory (*a*) 12-inch gauge	2·31
Capetown (Molteno Reservoir) ...	3·36
Do. (Platteklip)	4·34
Do. (Signal Hill)	1·96
Do. (Hospital)	2·01
Sea Point (The Hall)	2·08
Camps Bay	2·45
Table Mountain (Disa Head) ...	4·22
Do. (Kasteel Poort)	7·34
Do. (Waai Kopje) ...	6·58
Do. (St. Michael's)...	8·11
Woodstock (The Hall)	2·57
Bishopscourt	4·79
Kenilworth	4·50
Wynberg (St. Mary's)	4·57
Groot Constantia...	4·35
Tokai Plantation	4·66
Muizenberg (Cooper)	3·31
Cape Point	1·70
Blaauwberg Strand	2·00
Robben Island	2·01
Durbanville	2·27
Tamboers Kloof	2·89
Woodhead Turn	6·41
Lower Reservoir	3·68
MacLear Beacon	9·20
Waai Vlei	8·79
Woodhead Dam	7·49

II. SOUTH-WEST :	
Eerste River	1·91
Klapmuts	3·25
Stellenbosch (Gaol)	3·13
Somerset West	2·60
Paarl	2·72
Groot Drakenstein (Weltevreden)	3·39
Porterville Road	1·52
Tulbagh	1·31
Rawsonville	1·86
Caledon	1·18
Worcester (Gaol)...	0·85
Hex River...	1·24
Karnmelks River...	1·64
Lady Grey (Division Robertson).	1·14
Robertson (Gaol)...	1·05
Do. (Govt. Plantation) ...	1·06
Danger Point	2·92
Elgin Plantation	3·39

II. SOUTH-WEST (*continued*):	*Inches.*
Elsenberg Agricultural College...	2·91
Roskeen	1·31
Vruchtbaar	2·68
Ceres (Heatlie)	3·10
Waverley (Tulbagh)	2·30
Dwaars Riviers Hock	5·85

III. WEST COAST :	
Anenous	0·50
Klipfontein	0·69
Kraaifontein	0·53
Springbokfontein...	0·70
Garies	0·52
Lilyfontein	1·37
Van Rhyn's Dorp	0·47
Dassen Island	1·68
Kersefontein	1·14
The Towers	1·89
Malmesbury	2·02
Piquetberg	3·90
Hopefield	1·67
Algeria (Clanwilliam)	3·23
Cedarberg (Clanwilliam) ...	3·59
Wupperthal	1·40

IV. SOUTH COAST :	
Cape Agulhas	1·24
Swellendam	1·87
Potberg	2·40
Heidelberg	1·17
Riversdale...	1·75
Vogel Vlei...	2·05
Mossel Bay	2·17
Great Brak River	1·69
George	2·88
Millwood	3·23
Sour Flats...	2·16
Plettenberg Bay	2·28
Harkerville	3·46
Blaauwkrantz	2·95
Lottering	3·71
Storms River	3·15
Humansdorp	2·34
Cape St. Francis	4·01
Kruis River	0·84
Uitenhage (Gaol)...	1·28
Do. (Park)...	0·93
Do. (Inggs)	0·99

IV. SOUTH COAST (*continued*):

	Inches.
Armadale (Blue Cliff)	1·38
Dunbrody	0·88
Port Elizabeth (Harbour)	3·55
Do. (The Slip)	3·86
Do. (Walmer Heights)	4·11
Shark's River (Nursery)	3·53
Centlivres	0·80
Edinburgh (Knysna)	3·51
Gamtoos Station	1·77
Zoetendals Vallei	1·42

V. SOUTHERN KAROO:

Triangle	1·18
Pietermeintjes	1·25
Ladismith	2·02
Amalienstein	1·64
Oudtshoorn	1·12
Uniondale	1·49

VI. WEST CENTRAL KAROO:

Prince Albert	2·34
Dunedin	2·41
Nels Poort	1·05
Camfers Kraal	0·95
Willowmore	1·77
Rietfontein	1·43
Lemoenfontein	1·05
Merweville	1·83

VII. EAST CENTRAL KAROO:

Klipplaat	1·23
Graaff-Reinet (Gaol)	0·61
Do. (Eng. Yard)	0·40
New Bethesda	1·06
Roodebloem	0·51
Glen Harry	0·95
Wellwood	1·59
Jansenville	1·06
Roode Hoogte	1·47
Klipfontein	0·58
Middlewater	0·84
Somerset East (Gaol)	0·88
Dalham (Graaff-Reinet)	0·66

VIII. NORTHERN KAROO:

Sutherland	2·03
Fraserburg	2·53
Carnarvon	2·70
Victoria West	1·79
Britstown	1·50
Wildebeestkooij	1·03
Murraysburg	1·22

VIII. NORTHERN KAROO (*continued*):

	Inches
Theefontein	1·04
Schuilhoek	0·50
Vosburg	1·47
Zwavelfontein	1·82
Hotweg Kloof (Cradock)	0·70
Thebus Waters	0·38
Ruightersfontein	0·39

IX. NORTHERN BORDER:

Pella	0·24
The Halt	0·00
Kenhardt	1·44
Upington	0·58
Van Wyks Vlei	1·80
Prieska	1·57
Dunmurry	0·82
Karree Kloof	1·07
Douglas	0·25
Douglas (Voss)	0·26
Hopetown	0·42
Newlands (Barkly West)	0·24
Barkly West	0·18
Kimberley (Gaol)	0·34
Strydenburg	0·51
Stoffkraal (Prieska)	0·35
Sunnyside (Hay)	0·79
Rocklands	0·32
Peters Park (Gordonia)	0·60
Sydney-on-Vaal	0·08
Warrenton	0·00

X. SOUTH-EAST:

Melrose (Division Bedford)	0·66
Dagga Boer	0·85
Lynedoch	0·77
Alicedale	0·42
Bedford (Gaol)	0·95
Do. (Hall)	0·92
Sydney's Hope	1·31
Adelaide	0·33
Atherstone	0·97
Alexandria	4·36
Fort Fordyce	1·10
Grahamstown (Gaol)	1·58
Heatherton Towers	0·55
Sunnyside	1·32
Fort Beaufort	0·51
Katberg	1·45
Seymour	1·05
Glencairn	1·30
Hogsback	2·81
Peddie	0·39
Cathcart (Forman)	0·85
Cathcart	0·35
Thaba N'doda	0·80
Evelyn Valley	4·05

X. SOUTH-EAST (*continued*):	Inches.
Crawley	0·44
Pirie Forest	0·57
Isidenge	1·01
Kologha	0·45
Fort Cunynghame	0·86
Kubusie	1·07
Quacu	0·34
Blaney	0·15
Bolo	0·32
Fort Jackson	0·00
Komgha (Gaol)	0·38
Chiselhurst	0·41
East London West	0·44
Cata	0·80
Wolf Ridge	1·43
Dontsah	0·97
Mount Coke	0·14
Albert Vale (near Bedford)	0·76
Insileni	0·52
Eastover	0·28
Debe Nek	0·70
Middle Drift	0·30

XI. NORTH-EAST:	
Venterstad	0·31
Burghersdorp (Gaol)	0·40
Ellesmere	0·30
Lyndene	0·46
Thibet Park	0·30
Sterkstroom (Gaol)	0·38
Aliwal North (Gaol)	0·31
Jamestown	0·42
Queenstown (Gaol)	0·06
Herschel	0·97
Lady Grey	1·29
Lady Frere	0·49
Keilands	0·36

XI. NORTH-EAST (*continued*):	Inches.
Barkly East	0·54
Hughenden	0·39
Indwe (Collieries)	0·42
Sunnymeade (Div. Albert)	0·26
Clifton (Sterks.)	0·11
Edendale	0·46
Avoca (Barkly East)	1·72

XII. KAFFRARIA:	
Ida (Xalanga)	0·77
Slaate (Xalanga)	1·17
Cofimvaba	0·50
Tsomo	0·36
N'qamakwe	0·81
Main	0·40
Engcobo	1·39
Kentani	1·12
Maclear Station	1·19
Bazeya	2·26
Willowvale	1·55
Somerville (Tsolo)	0·91
Elliotdale	1·15
Umtata	0·80
Cwebe	1·50
Tabankulu	1·39
Kokstad	0·99
Do. (The Willows)	1·02
Flagstaff	1·43
Insikeni	1·60
Port St. Johns	0·97
Kilrush (Sneezewood)	0·35
Umzimkulu	0·81
Do. (Strachan)	1·01
Wanstead	1·13
Cedarville	1·17
Clarkbury (Engcobo)	1·16

NATAL.

	Inches.
Durban (Observatory)	1·07
Do. (Point)	1·43
Stanger	3·01
Ottawa	1·85
Verulam	2·38
Mount Edgecombe	1·60
Cornubia	1·61
Saccharine	1·47
Milkwood Kraal	1·25
Blackburn	1·80
Umbogintwini	1·10
Winkel Spruit	0·96
Port Shepstone	1·11
Imbizana	0·50
Umzinto	1·24
Mid-Illovo	1·53
Bulwer	1·53
Himeville	1·43
Richmond	2·47
Pietermaritzburg	1·98
Cedara (Vlei)	1·20
Do. (Hill)	1·65
Giant's Castle	1·90

	Inches.
Howick	2·24
New Hanover	2·84
Kranztkop	4·16
Greytown	4·66
Lidgetton	2·03
Nottingham Road	1·36
Estcourt	1·20
Weenen (Experimental Farm)	2·08
Mpofana	3·38
Ladysmith	2·15
Dundee	1·89
Newcastle	1·50
Vryheid	1·89
Paulpietersburg	2·92
Ngomi Forest	2·95
Ubombo	1·58
Nongoma	2·51
Hlabisa	3·87
Mahlabatini	2·73
Melmoth	2·80
Empangeni	2·74
Mtunzini	5·50

TRANSVAAL.

	Inches.		Inches.
Barberton	0·15	Klerksdorp	0·19
Komatipoort	0·15	Pretoria (Arcadia)	0·09
Bethal	1·02	Modderfontein	0·06
Christiana	Nil	Rustenburg	Nil
Ermelo	0·49	Mbabane	0·36
Vereeniging	0·05	Volksrust	0·79
Heidelberg	0·15	Wakkerstroom	1·10
Lichtenburg	0·08	Nylstroom	Nil
Pilgrims Rest	0·37	Potgietersrust	Nil
Belfast	0·63	Krugersdorp	0·01
Zeerust	0·02	Joubert Park	0·07
Middelburg	0·31	Observatory	Nil
Piet Retief	0·16	Pietersburg	Nil
Potchefstroom	0·02	Louis Trichard	0·09

ORANGE FREE STATE.

	Inches.
BETHLEHEM DISTRICT:	
Abersethin	0·42
Kaal Laagte	0·28
Middelpunt	0·50
Novo	0·73
Reitz	0·85
Stolzkop	0·80
Whinburn	0·66
Rondehoek	0·81
BETHULIE DISTRICT:	
Town	0·27
Abercairn	0·31
Niet te Weet	0·35
Normandale	0·38
BLOEMFONTEIN DISTRICT:	
The City—	
Government Laboratories	0·07
Grey College School	0·11
Hamilton Park	0·11
St. Michael's School	0·08
Doornplaat	0·80
Dunmanway	Nil
Ellerslie North	0·30
Glen Lyon	0·18
Nieuwjaarsfontein	0·44
Pukpoort	0·15
Reddersburg	0·23
Rodepoort	0·42
Kromdraai	Nil
Sannah's Post	0·22
Waaihoek	0·05
Witkops	Nil
BOSHOF DISTRICT:	
Beginseldam	0·40
Brakfontein	0·03
Kalkpan	Nil
Knapdaar	Nil
Smithskraal	0·15
EDENBURG DISTRICT:	
Bethany Village	0·22
Excelsior	0·21
FAURESMITH DISTRICT:	
Bergfontein	0·32
Brakdam	0·68
Koffyfontein	0·18
Lokshoek	0·37
Mimosa	0·66
FICKSBURG DISTRICT:	
Caledon Draai	0·95
Dekselfontein	0·33
Dunblane	0·88
Gunton	0·80
Hammonia	0·53
Imperani	1·11
Kranskloof	0·21
Platkop	0·99
Kuklington	0·72
FRANKFORT DISTRICT:	
Town	0·30
Muirton	0·27
Vryheid	0·12
Zandoog	0·32
HARRISMITH DISTRICT:	
Africa's Kop	0·87
Arbeid Adelt	1·34
Tandjesberg	1·08
Forest Station	0·64
King's Hill	0·62
HEILBRON DISTRICT:	
Brereton	0·16
Honing Kloof	0·20
Kroonbank	0·46
Springbokvlaagte	0·29
Villiers	Nil
JACOBSDAL DISTRICT:	
Town	0·30
Aschboschdam	0·24
Aurora	0·03
Koppieskraal	0·35
Zoutpan	1·21

Station	Inches.
KROONSTAD DISTRICT:	
Town	0·18
Carisbrooke	0·11
Gelukfontein	0·12
Holfontein	0·23
Vierfontein Mine	0·17
Voorspoed	0·25
Waterford	0·21
Roodewal	0·43
Hebron	0·01
LADYBRAND DISTRICT:	
Town	0·51
Alma	0·66
Barletta	0·67
Braemar	1·60
Clocolan	1·01
Government Nursery	0·65
Modderpoort	0·82
Moria	0·63
Westminster	0·06
Zorgvliet	0·66
HOOPSTAD DISTRICT:	
Fairfield	0·32
Odendaalsrust	0·60
Roodepoort	0·06
PHILIPPOLIS DISTRICT:	
Highbury	0·32
Krielsfontein	0·29
ROUXVILLE DISTRICT	
Town	0·48
Clearwater	0·39
La Mortola	0·26
Middelplaats	0·45
Riversdale	Nil
Sterkfontein	0·41

Station	Inches.
SMITHFIELD DISTRICT:	
Helvetia	0·05
Settlement	0·23
THABA 'NCHU DISTRICT:	
Town	0·53
Fort Bassett	1·10
Moroka Industrial School	0·74
Mount Stephen	0·31
The Cliff	0·64
Thorley	0·78
Tweespruit	0·60
Wilgeboom Nek	0·73
York	0·63
Likatlong	0·27
VREDE DISTRICT:	
Woudzicht	0·55
LINDLEY DISTRICT:	
Town	0·05
Waterford	0·10
Wexford	0·90
WEPENER DISTRICT:	
Lucerne Valley	0·42
Mon Repos	0·37
Wonderboom	0·70
WINBURG DISTRICT:	
Town	0·42
Bantry	0·55
Beddington	0·42
Burnet Holm	0·13
Grootkuil	0·23
Paardekraal	0·56
Smaldeel	0·13
Vaalbankskuil	0·21
Foxhill	0·79

Departmental Notices.

FARM EMPLOYMENT.

Scotch tenant farmer, with life experience of pedigree and prize stock, desires management of stud or stock farm, or to assist on large ranch. Especially desirous of getting into touch with persons wishing to import Clydesdales. Eight years in Africa; retrenched from Government service; testimonials and references; age 45; not married.—Apply A. W. DORMAN, Wessels Nek, Natal. [7]

Applicant, married, age 40, desires situation as farm manager. Fifteen years' experience in Natal—stock and agriculture. Proficient in dairy work and management. Good references.—" C ", P.O. Box 17, Potchefstroom, Transvaal. [8]

Scotsman, married, 28 years of age, eleven years' experience of mixed farming and wattle growing in Natal, desires situation as manager on farm.—R. G. H., c/o Lake Hotel, Mooi River, Natal. [8]

Applicant, 25 years of age, desires situation as farm assistant. For past six years has been engaged on farms in Canada and England, where he has had considerable experience in all departments of agriculture; and for some time in Canada did a good deal in tobacco growing, on the American system—is thoroughly conversant with sowing, transplanting, cultivating, stripping, etc.—HERBERT WARDER, 36 Good Hope Street, Kensington, Johannesburg. [10]

Young man seeks employment on farm; Colonial born; 25 years of age. Experienced in fruit farming, and can work with cattle, horses, and mules. Speaks both English and Dutch. Strong, healthy, sober; testimonials.—G. J. ROSSOUW, jun., Rose Street, Wellington, Cape Province. [10]

Applicant, 22 years of age, desires position as manager or under manager on farm. Two years at Elsenberg Agricultural College; testimonials.—D. WOODHEAD, " Cottesbrook ", Kroomie, Cape Province. [10]

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Notice to Subscribers.

Subscribers to the *Agricultural Journal* are requested to note that subscriptions fall due and are payable at the end of the year. All subscriptions should be forwarded to the Government Printer, P.O. Box 373, Pretoria.

Pernicious Scale: Reporting Suspected Occurrences.

Occupiers who suspect Pernicious (San Jose) Scale to occur on their property are urged to send infested cuttings from their suspected plants to the Department of Agriculture without delay. A note giving the sender's name and address should be enclosed in every sending, and particulars of the case given in an accompanying letter. Specimens may be addressed (1) Entomologist, Department of Agriculture, Pretoria, or (2) Entomologist, Department of Agriculture, Pietermaritzburg, or (3) Entomologist, Department of Agriculture, Capetown, and may be sent O.H.M.S. by letter post. The pest infests the apple, pear, peach, plum, quince, apricot, cherry, medlar, hawthorn, and rose, and unless it is plentiful on one of these plants the ordinary observer is not likely to find it on others. It does not trouble the orange, lemon, or naartje, and it has not yet been noticed on seringa (*Melia*), silky oak (*Grevillea*), or blackwood, or black wattle, or other of the acacias—all of which plants are very subject to scale insects of some other kind. The bark is chiefly attacked by the scale, but the fruit may get considerably infested. The scales individually are not as large as the head of a common pin. They are much like those of the common Red Scale in shape, but are smaller and more apt to be densely crowded together. Often they form an almost continuous scurf on the bark. Their prevailing colour is an ashy grey. Badly infested trees are unthrifty and, generally, more or less of the wood is dead. The insect is supposed to have got to South Africa in 1904 or 1905, and it is on or near fruit trees planted since 1906 that it is most likely to be found. In many cases, trees which were infested when planted have died out, but not before the insect had become spread to surrounding plants.

Codling Moth Prosecutions -Warning to Fruit Dealers.

It should be widely known among fruit dealers and others interested in the marketing of fruit, that Messrs. M. G. Netto and E. Qually, two retail fruit dealers of Potchefstroom, appeared before the Magistrate of Potchefstroom on the 29th August charged with contravening the Government regulations which prohibit the introduction of apples, pears, and quinces into a certain area of the Union from outside that area as a precaution against the introduction of the codling moth pest. In this particular case apples were said to have been introduced into Potchefstroom from Johannesburg by the defendants in May last. Both were found guilty and fines of £10 imposed. Fruit dealers in the protected area and also fruit shippers in Johannesburg, Pretoria, and other places outside the area should take warning.

Wheat in the Zeerust District.

Mr. P. J. Frost, P.O. Box 94, Zeerust, sends the accompanying photograph of a wheat land at Zeerust. The lady therein is 5 ft. 6 in. tall, which will give some idea as to the height of the wheat. Mr. Frost writes: "The photograph shows the fertility and fitness of the district as a wheat-producing area. Notwithstanding the late severe

frosts, the wheat and forage crops throughout promise to be very good this season. When the Klein Marico River is dammed up on the farm Klein Marico's Poort, as has been proposed, a great extent of country now uncultivated would provide homes for a large population and increase the food-producing capabilities of the district."

South African Stud-Book.

The Acting Secretary of the Cape Stud-Breeders' Association, P.O. Box 703, has addressed the following circular to members of the association:—"I have to advise you that entries for Volume VI of the South African Stud-Book will be closed on the 31st December, 1911; and members are requested to arrange for the inspection

or registration before that date of all stock of which they wish the details to appear in the volume. If you have any entries to make, and have the details ready, I should be glad if you could send in the details now, so that there may be no delay in the work. Photographs of champion animals will be inserted at a charge of £2 per page. The photographs should be sent in as soon as possible. Only photographs of animals that have taken champion prizes at leading shows can be reproduced."

An Ostrich which Lays an Egg Daily.

Professor J. E. Duerden records an interesting case of increased egg-production in ostriches which has recently occurred in his experimental camps at Gowie's Park, Grahamstown. A breeding hen, which had been laying rather irregularly for some time, commenced to lay an egg daily. The first egg was laid on the 12th September, and the last on the 16th September, that is, five eggs in five days without a break. All the eggs were found to be fertile when placed in the incubator. After this supreme effort the hen skipped a day, and has laid rather irregularly since, occasionally with an egg on each of two successive days. In his note on the subject, Professor Duerden remarks:—"The normal rate of egg-laying of the ostrich is one egg on alternate days. Under favourable circumstances the domesticated bird will continue to lay an egg every two days for practically the entire breeding season, so long as the eggs are taken away as laid and the bird not allowed to sit. Very rarely an egg may be laid on each of two successive days, but apparently this has not been known to happen for more than two successive days. The increase is no doubt induced by a high state of nutrition of the ovaries."

United States National Irrigation Congress.

The President of the University of New Mexico and Foreign Secretary of the National Irrigation Congress writes as follows *re* the nineteenth National Irrigation Congress which will convene this year in Chicago, Illinois:—This Congress, which is the most important agricultural economic association in the United States of America, has in the past chiefly devoted its attention to the development of the resources of the western portion of the United States, and was mainly instrumental in the passing of the Reclamation Act, under the terms of which the Government has expended more than sixty millions of dollars in the irrigation of arid lands in the west, and is now administering the expenditure of an additional sum of forty-eight millions for the same purpose. At the forthcoming session in Chicago attention will be given not only to irrigation but also to drainage and other means of land reclamation; in short, all subjects which come within the scope of land reclamation will be considered at the Congress, both in regard to their immediate and potential advantage to the community, and also with respect to the best means of handling the problems involved in the most effective manner.

For several years past, the National Irrigation Congress has been attended by delegates from all parts of the world, either officially

representing foreign Governments interested in land reclamation, deputed by provinces, municipalities, or corporations, or being themselves personally concerned in land reclamation and development; and the interest and value of the meetings has been largely increased by their presence and the contributions they have made to the deliberations of the Congress. I am therefore writing to you in the hope that you may feel yourself sufficiently interested in this important assembly either to attend the meeting in person or send a representative on your behalf; and in either event the national officers of the Congress will be greatly pleased to welcome the visiting delegate and to furnish him with all information and assistance in their power.

Tanneries in the Transvaal.

Mr. G. E. J. Henny, 264 Vermeulen Street, Pretoria, writes: According to official statistics, 1¼ million pounds sterling worth of leather and leatherwares were imported into the Union during 1910. This large sum we paid for our shoes, harness, belts, saddles, etc. These articles are mostly made from local skins and hides tanned with our bark. The skins and bark are shipped from South Africa to England and the leather and leatherware returned. Of all industries to be started in the Transvaal a tannery stands a favourable chance on account of the fact that we have all the raw materials here in the country, viz., hides, bark, lime, fat, etc., and these materials are cheap—hides and bark are 15 per cent. cheaper here than they are in London, and the prices of imported leather and leatherwares are 20 per cent. higher here than in Europe (on account of the expense of transport). This more than makes up the higher cost of labour, which, in our case, will not be excessive because we do not require the extensive plants for artificial drying here which are necessary in Europe on account of our favourable climate. With the latest invented machinery we do not require many skilled labourers; most of the work can be done by young Afrikanders who are willing to learn a trade, and, if sure of permanent employment, are willing to work for from 5s. to 10s. per day.

By starting our own tanneries the farmers will have a good market for local skins in exchange for the finished and manufactured leather, and can make their own shoes, harness, etc. If they start planting wattle trees on their farms they will have a good market for their bark, besides the wood for mining poles. Many women and children can make a living by collecting the bergbast (a small scrub tree) growing in the hills, especially in the Rustenburg and Waterberg Districts. Our South African sumac is very useful for the tanneries; the same sumac grows in the south of Italy and Greece, and fetches high prices in Europe. Thousands of people will find work in this trade, and the money will remain and circulate in the country instead of being sent oversea. Australia, which was in the same position thirty years ago, is able to export leather already to South Africa and England. Before the war a tannery was working in Pretoria and closed down at the outbreak of the war. Influential men are now working to form a new company. The reason for forming the proposed company is because, in my opinion, it is the most favourable time

to start this industry, which will provide work and a living for hundreds of people. I am sure of success if started and worked on the same economical and business-like way as the old tannery was at first. The latter, which was started in 1886, was managed for five years by a London syndicate, which took over the factory and paid a very high price, floated it into a large company with a capital of £100,000, and imported expensive machinery and labour. By working on such an expensive scale they could not pay dividends, but under the new conditions success is anticipated.

Capetown as a Port for Provisioning Ships.

The Secretary of the Capetown Chamber of Commerce has addressed an open letter on the above subject to all farmers and growers of Colonial produce, in the course of which he says:—The Capetown Chamber of Commerce is engaged in making inquiries into the possibility of inducing ships to call at Table Bay in larger numbers for the purpose of taking in provisions for passengers and crews, and thus restore the custom which prevailed many years ago, and open a fresh source of trade for Capetown and the surrounding agricultural districts of the Western Province. Through the extension of the trade in the bunkering of coal for ships, they are calling in increasing numbers at Table Bay, and a better opportunity now exists than of recent years for carrying out such a proposal. In addition, a number of other vessels round the Cape which could be induced to take in provisions, provided they are able to depend upon a *constant* supply of commodities at prices which would compete with those paid in Europe and other parts of the world.

It is proposed as a basis for a scheme that a wholesale market shall be established in a locality convenient to the Table Bay Docks as well as Capetown, and that the agents or representatives of ships shall make their purchases in such quantities as they require from farmers and others who would be prepared to have a stand at the market and dispose of such produce out of hand, for which there is a constant demand. To make such a scheme a success it is necessary in the first place that there shall be a *constant* supply of such provisions as are required by passing ships; secondly, that prices shall compare favourably with those prevailing in Europe; and thirdly, that the shipping companies may know the times of year when they may depend upon being able to obtain good supplies of certain commodities at this port. In addition, such a market as is proposed would be convenient for supplying hotels, cafés, boarding-houses, and even private residents with commodities out of hand, for which there is always a good and continuous demand.

The proposed market could be available for selling out of hand not only garden produce but such commodities as butter, cheese, eggs, poultry, honey, jams, preserves, etc. Garden produce would include fruit of all descriptions, such as grapes, apricots, peaches, plums, pears, apples, oranges, lemons, strawberries, Cape gooseberries, rhubarb, dried fruits of every description, walnuts, chestnuts and other nuts, potatoes, onions, turnips, carrots, tomatoes, parsnips,

swedes, sweet potatoes, cabbages, cauliflowers, brussels sprouts, broccoli, vegetable marrow, pumpkins, peas, beans, green mealies, asparagus, mushrooms, celery, lettuces, radishes, beetroot, etc. Then there would be meat, such as beef, mutton, lamb, pork, veal, buck, and other game. As stated before, one of the first essentials to success is to know the seasons when farmers and others can supply these provisions. Farmers, growers, market gardeners, and others concerned are therefore invited to communicate with the Secretary of the Chamber of Commerce, P.O. Box 204, Capetown, and state (*a*) which of the articles mentioned can be supplied; (*b*) the seasons of the year when such supply can be depended upon; and (*c*) the approximate quantities of each article which would be available. In order to achieve success, it is essential that producers shall assist the Chamber in every possible way, and it is therefore hoped that they will reply to this letter in large numbers. It would be a convenience if farmers and others would send in this information as early as possible. Very little progress can be made until the particulars here asked for are collected.

Export of Angoras.

At a recent meeting of the Zwart Ruggens Farmers' Association (Cape) an interesting discussion took place on the question of the export of Angora goats and the effect of the policy of the Government in this regard upon the mohair trade. The discussion arose as a result of a motion by Mr. Percy Hobson, "that all restrictions as to the export of Angoras from South Africa be entirely removed". In moving, Mr. Hobson said that a monopoly was all very well if the article protected was only a luxury, such as diamonds and feathers, but mohair was a very different thing. They had too much at stake, and they should make mohair as much an article of necessity as wool was to-day. Some people seemed to have the idea that if the restrictions were removed there would be a danger of over-production of mohair, but he did not see any need for fear on that score, as only a very limited portion of the globe was suitable for Angora goats. He considered that if they took it that nine-tenths of the globe was suitable for sheep, then only one-tenth was suitable for Angora goats. Thus there was no fear of over-production if mohair came into general use. These restrictions had limited the production a little, and Bradford to-day was able to consume all that was produced. The Germans took some, but they got it from Bradford, and Bradford had no competition. They depended upon Bradford for all the brains to make a market. Would it not be to their advantage if they could get other manufactories started? Government had not benefited by the duty, and no goats had been sold from South Africa because the duty was too high, and the farmers who wished to export lost the business. All the restrictions should be removed, and they should try to get Angora goats established in any part of the world where they were likely to succeed; this would lead to the establishment of more manufactories, and every man who put his money into a factory was at once an ally of the Angora goat farmers.

Mr. Maasdorp seconded the resolution. Mr. E. R. Hobson moved as an amendment: "That this Association is of opinion that the

present high export duty on South African-bred Angora goats should be reduced, preferentially to such countries as will allow a corresponding reduction in import duties on South African mohair". Mr. Harry Archer opposed Mr. Percy Hobson's motion. He declared that he had heard nothing from the speakers which appealed to him personally as an argument in any shape or form for the alteration of existing conditions, and they had the undoubted fact that mohair to-day was a drug in the market; to his mind, if America were allowed to get the rams and improve and increase the production it would make the position very much worse than it was now. He informed the meeting that there were 9000 bales of mohair lying at Port Elizabeth at the moment. At present American buyers went over to Bradford for the mohair, where it was made up, and Bradford seemed to be the only place in Europe which had the water and climatic conditions suitable for the manufacturing of mohair. He contended the motion would be entirely in favour of the ram breeders, and while no doubt they would all like to see the ram breeders make more money, still he maintained the welfare of the whole industry must be considered, and the breeders had plenty of scope in South Africa. After some further discussion the motion was lost by seven votes to eleven.

Farmers' Credit.

Mr. Karl Gundelfinger, of Durban, contributes an interesting article on "Natal, its Industries and Commerce" to the current *South African National Union Annual,* in the course of which he dwells upon the question of the length of credit taken by farmers, and discusses the indirect effect this credit system has on the cost of living. After dealing with the sugar, tea, wattle, milling, dairying, mining, and various manufacturing industries, commerce, and the Indian labour question, he proceeds:—"To return again to commerce, it is necessary to inquire into the system of credit in vogue, as credit is, to a large extent, the index of the soundness or otherwise of trade. We again have to start with the farmer; it is he who sets the pace to commerce, and it is he that directly and indirectly dictates its terms of credit. In years gone by, when the ox-wagon was practically the only means of transport, he went to market once or twice a year for the sale of his products, the settling of his accounts, and the purchase of his requirements. A yearly credit was customary, whilst the storekeeper, to reimburse himself for the lengthy credit taken and consequent loss of interest, had to charge accordingly high prices. The advent of the railway and the general development of the country have, however, completely changed the conditions that governed this system of credit. If a farmer is near a railway line he can go to market whenever he requires or desires to do so. If he is a distance away from the line then the many travelling agents, traders, etc., and also the country stores now existing on all high and by ways bring, virtually speaking, the market to his door. Whilst he has ever so many and frequent opportunities to dispose of his products as ready, he still clings, or many of them at least, to the old habit of taking lengthy credit, even if he has ready money at his disposal. As some farmers keep the storekeeper out of his due for such a long period, so must the latter in return demand long credit from the merchant, and as some one has to pay for this credit and the risk attached to all credit, it naturally falls on the shoulders of the consumer; in this

instance the farmer. Agricultural societies would do well to impress upon their members the fallacy of this system of long credit, educate them up to the cash system, and an important step towards reduction in cost of living in this country will have been made."

Local *versus* Central Shows.

In the course of his address at the annual general meeting of the New Hanover (Natal) Agricultural Association held last month, the retiring president, Mr. Edwin Peckham, J.P., discussed the question of local *versus* central shows. He said: "I do not agree with those who think that the time has arrived when local shows should be discontinued. On the other hand, I firmly believe that local shows serve a good purpose, that they act as feeders to the central show, and that they tend to foster and develop intelligent competition and progress in whatever district they are held. In many cases, farmers in outlying districts would never have been induced to commence exhibiting at the central show if it had not been that they had first been stimulated thereto by successes gained at their local shows. The spirit of competition, and the desire to produce the best, is naturally commenced, fostered, and developed when in a country district farmers meet together and see exactly by comparison what each can produce. In our own association we have had instances, familiar to most of us, of our own members competing keenly against each other at our local show, the successful competitors realizing what they could produce, then going further afield to the central show to exhibit there with marked success. It is very probable that if such exhibitors had not had the opportunity at our local show of trying their strength among their own friends they would not have been induced to have exhibited at the central show. As a matter of fact, I am quite convinced that local shows serve as feeders to the central show, just as in sports the local club sends forth its champion to compete in the stadium. If it were not for local competitions the central show would not be what it is to-day, and I trust it will be long before local shows are discontinued."

The Sugar Situation.

The Economist (London), in a recent issue, discusses the rapid rise in the price of sugar which has recently taken place. After commenting upon the fact that the lowest price for eighty-eight beetroot noted this year in the early weeks was 8s. 10½d., and that at the time of writing (16th September) the lowest price can be called 18s. 6d., the journal proceeds: The initial cause of the upward movement of the market was the disclosure of the fact that the crop of cane sugar on the season was going to be considerably short of estimates on account of storm ravages during harvest. Without going into details, the crop of cane sugar marketed during the season just closed was about 500,000 tons short of the estimates, though the realized crop of beet came well up to expectations. The market rose on the prospective shrinkage of stocks before the next crops could be discounted, and then on the top of a firm and rising market came one of the most remarkable summers on record. It was remarkable for heat and drought almost all over Europe. The effect on growing

crops was so threatening that, by the month of July, a deficiency in the beet harvest was foreseen, and the beet sugar market began to jump. There are many persons in the trade who think it has already jumped too high, but it has to be remembered that no one can yet forecast what the European beet crop is likely to be. It will certainly be short of last year, but how much short is meanwhile a mere matter of guesswork.

The current gossip of the market is that the European shortage will not be less than a million tons, and it is quite possible that the yield of Germany, Austria, and France may be short to that extent of last year's crop. We shall know better as to that when Mr. Licht issues his usual annual forecast next month. But even if the shortage in western Europe does measure a million tons, it is estimated that the Russian crop will have a surplus to almost the same extent. This also is guesswork, but one guess is as good as another. The certainties are that Germany, Austria, and France have bad crops, and that Russia, with less drought and large acreage, has a good crop. The one may counterbalance the other if the Brussels Convention countries will relax the rule which limits Russian exportation. Then the exports of the growing cane crops point to a prospective increase in the cane crop of 500,000 to 700,000 tons over last year, this estimate being mainly based on the conditions in Cuba. The prospects, then, are not so gloomy as the sugar bulls paint them and as the speculators for the rise would have it. But there is always the fact that the consumption of sugar is a constantly growing one, and the inference is that it will go on growing even if the crop is stationary. That, however, is not in accordance with probability. To double the price will certainly be to check the consumption in many directions. And it is already calling forth reserves of stock not figuring in the returns of visible supply. Of course, it is quite possible for the actual beet harvest to be worse than is predicted, seeing the crops are not yet garnered, but the recent reports are more promising, as there has been rain, which has relieved the situation. Thus the sugar market is just now in a critical situation, but more likely to go down than to go up. The price has reached a dangerous height and one apparently above what is warranted by the situation and prospects.

Destruction of Prickly Pear.

So many inquiries are being received for particulars as to methods of destroying the prickly pear that it is thought advisable to publish details of Mr. Jansen's preparation, which has been used with so much success in the past in the Cape Province. The solution and its method of application are as follows:—(1) Boil thoroughly for 30 minutes half a pound (½ lb.) of good finely powdered lime and half pound (½ lb.) sulphur in one gallon of water. An extra quart of water should be added to above to allow for evaporation whilst boiling. (2) Dissolve half a pound (½ lb.) of salt and half a pound (½ lb.) of arsenite of soda in one gallon *boiling* water. (3) Mix the above Nos. 1 and 2 together, which will then equal two gallons fluid stuff. (4) To be applied as the tree stands, as follows: Make an incision with a knife, with a sharp point, two to three inches deep into one or more leaves, according to size of tree, and inject the poison.

The above is the whole operation from start to finish, and it is only necessary to enlarge on point 4, i.e. method of application. The number of incisions necessary for a tree can soon be gained after a short experience with the extirpator. For instance if a tree of medium size contain one stem with no branches one injection at the top of the tree will be sufficient to destroy the whole tree. Thus it only needs a little foresight to enable the work to be done with the least expense. The method of injection is as follows:—The leaf which is selected for the injection is pierced with the sharp pointed knife at the top side of the apex and the knife is then moved backwards and forwards to enlarge the incision. The knife is given a half twist to open the incision made, and to keep it open a pebble is dropped into the opening. A little of the extirpator is then poured from a kettle into the opening, care being taken, however, to keep the fluid well stirred before pouring it out. The poison travels down the stem, inoculating the leaves as it passes. In doing large dense patches the outside fringe must first be treated, and as these die down the work is repeated on the next fringe, and so on till the centre is also treated. This preparation is not meant to be sprayed, and can only be used as per instructions. With reference to its properties should stock eat the treated leaves, nothing has really been proved, so that it would be advisable to keep stock away from the area under treatment until all likelihood of danger has passed.

The Suffolk Punch.

Discussing the merits and capabilities of the Suffolk Punch and its suitability for South Africa, Mr. A. Edmonson, Berea Livery Bait Stables, Durban, in the course of a communication to this journal, writes:—"The Suffolk Punch is the finest breed of horse, suitable for either cart or town work, for which there is a large demand, and it is certain to realize excellent prices, providing the breeder supplies the proper article. The Clydesdale and Shire are very useful and excellent as cart horses, but are not the horses for Natal. They depreciate in hot climates, as they are coarse in bone, and very feathery, and slow in action; and the natural resources of this Province are not adapted to sustain bone that is already coarse, and requires lime and phosphates, in both of which Natal soils are deficient. The smartness and utility of the Suffolk Punch, its quality of bone, shortness of leg, absence of feather, and breedy coat, show how useful the animal is, and in addition it can do more work on less corn than any other horse I know of. The perfect symmetry of loin, short powerful sweep, closely yoked-up quarter. and muscular, short legs, keep them always on the good-looking side, while the long-backed, loose-loined, flat-ribbed cart horse that is often bred in Natal at present, always looks poorer than he really is.

The judge at the Durban Show admired this horse very much. and, remarking it was the very horse for this country, expressed the hope that many would follow in importing the same breed, as they were absolutely necessary to breeders who wished to make horse-breeding pay. The Home Government use Suffolk Punch horses

for heavy gun work in the British Army. They are horses which can stand hot, dry climates, and do not depreciate in bone. The demand is enormous at Home for them now, as Spain, Australia, South America, and Canada are very anxious to get them, and pay heavy prices to get the breed in those countries. My advice to young farmers who want to breed good, useful farm horses, active and powerful, useful for vans and trolleys in town, and a good, all-round money-making line in horse-breeding, is to import the Suffolk Punch or breed from those already imported. They cannot go wrong, and as a result they will bring into the market a higher standard of horse than we have to-day, which is badly needed. The Suffolk Punch horse is easily handled. Sir Cuthbert Quilter, the president of the Suffolk Horse Society, remarked at the annual meeting this year that the difficulty was not in sending the Suffolk Punch away, but in breeding.

Charcoal Burning.

Mr. C. E. Lawford, Mortimer Station, C.P., writes:—"Will you kindly request burners of charcoal to inform me through the medium of the *Agricultural Journal* as to the number of bags of charcoal they obtain from a buck-wagon load of wood burnt." Will readers who are in a position to do so please comply?

George Agricultural and Industrial Exhibition.

The honorary secretary of the George Agricultural and Industrial Exhibition writes that Wednesday, 10th March, 1912, has been decided upon as the date on which the exhibition will be held.

Humansdorp Agricultural Association.

The hon. secretary of the above informs us that it has been decided to hold the next annual show of the association on the 13th and 14th March, 1912.

The Prospects for Wheat Cultivation in Natal.

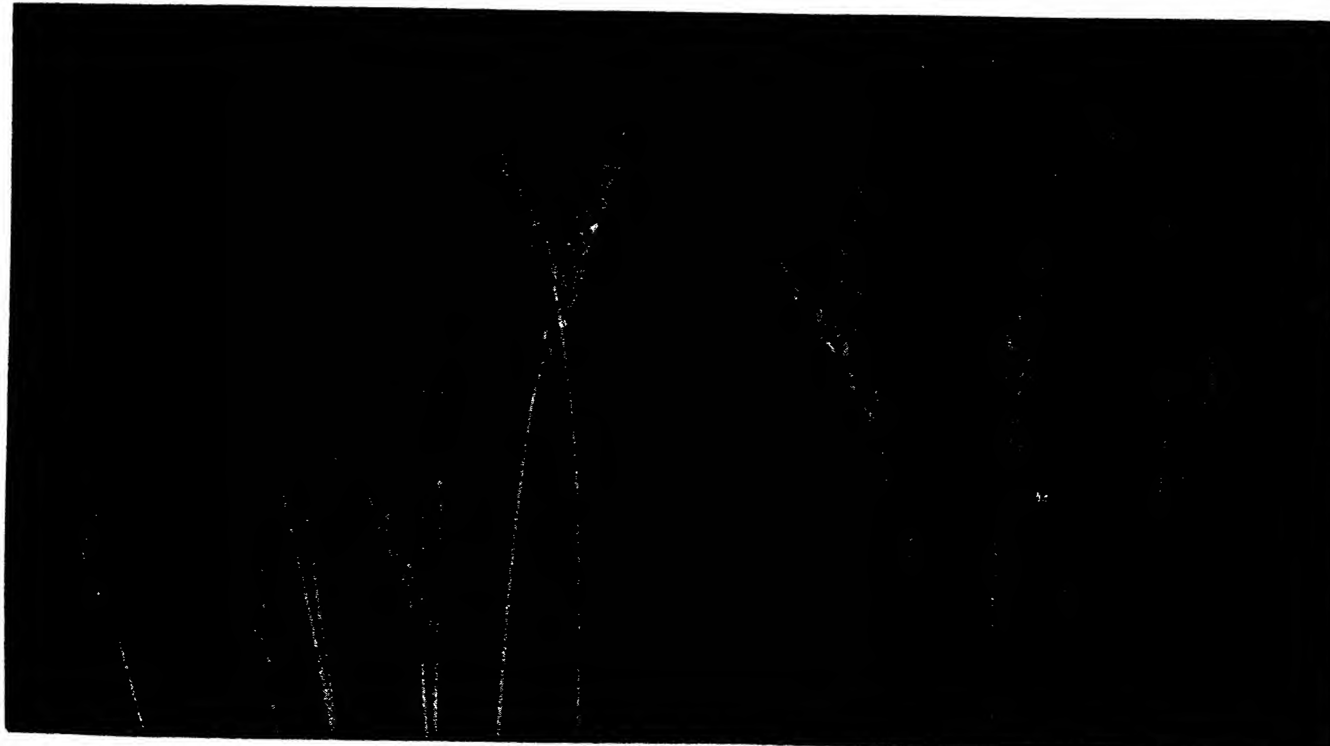
By E. R. Sawer, Director, Division of Agriculture (Natal).

Distinct wheat and maize belts have been recognized in all Continental areas with a large extension in latitude, and it is a noteworthy fact that such belts rarely overlap to any considerable extent. It would consequently appear that the climatic conditions obtaining in a given area are relatively favourable to one or other of the two great food crops, and that the less favoured staple can only be profitably grown where exceptional skill in selection and cultivation counteracts certain natural disadvantages. For example, while it may be possible to obtain spring wheats with a high degree of rust-resistance capable of making satisfactory development during the summer months in the best maize districts of Natal, there is less probability that the margin of profit on such cultivation will exceed that secured from the maize. Similarly the attempted introduction of flint maize to the spring wheat districts of the Cape Province can hardly be justified on economic grounds.

The above finding is advanced, however, subject to the reservation that mean temperature is a principal determining factor of the distribution of cereal crops, and that while such tropical and sub-tropic l crops as maize, kaffir corn, millet, rice, and buckwheat require the relatively high temperatures obtaining during the summer months for perfect development, the white straw crops such as wheat, oats, barley, and rye are capable of completing at least part of their growth during the winter season. The latter feature opens a prospect of a two-crop year, a solution of the rust problem, and an optimum mean temperature for both staples during the in-growing period over considerable areas in South Africa. The sole condition attaching to such a system is an adequate supply of water to the wheat during the dry months of winter, or, in other words, a comprehensive scheme of irrigation. Summer white straw crops are grown successfully, and dry-land winter cultivation is profitably practised in certain favoured districts, but any considerable extension of the wheat belts of South Africa must be by way of artificial irrigation during the dry season.

Nor is this contingency to be regretted, for "irrigation is a higher, more scientific, and more profitable industry than rain-farming". It may be remembered that the population of two-thirds of the land surface of the earth depend for their existence upon irrigation waters. Northern Africa, including Egypt, China, India, the great central plateau of Asia, and vast regions of North America and Australia, would be sterile and uninhabitable without the intervention of systems of irrigation, while in more favoured countries

The Prospects for Wheat Cultivation in Natal.



(1) Ears of Federation Wheat from the 1910 crop, Weenen Experiment Station, Natal.

(2) Ears of Bobs Wheat from the 1910 crop, Weenen Experiment Station, Natal.

irrigation supports an increased population by rendering intensive cultivation possible, enhances the value of land frequently a hundred-fold, improves the quality and adds to the quantity of grain, fruits, and vegetables, enriches the soil from year to year, renders the farmer independent of rainfall and thus ensures him against loss, leads to the production of two or more crops during the year in place of one grown under rainfall, and, in short, makes a prosperous country.

A two-crop year, obtainable by irrigation, is a first step to intensive cultivation, and constitutes good farming, for the winter fallow may be devoted to both revenue and restorative crops. A winter wheat of good character offers an excellent course for an intensive rotation, whereas a rust-proof summer wheat must necessarily occupy land to the exclusion of maize or other of numerous available summer crops. The following four-course rotation, occupying forty-eight months only, as adopted at the Weenen Irrigation Station, affords a good example of the introduction of winter wheat into the local system of irrigation farming for land unsuited to lucerne:—(1) Maize planted in November, with interplanted beans, receiving kraal manure and a dressing of superphosphate; harvested in April. (2) Winter wheat planted in May receiving a top-dressing of nitrate of potash; harvested in October. (3) Tobacco transplanted in December; harvested in March or April. (4) Winter field peas planted in May; harvested in October. The income from these five crops within two years affords the skilful irrigator a handsome livelihood from even a small bl ck of land under the furrow. The dressing of kraal manure is fined by the maize crop for subsequent use by the wheat, which also benefits from the residue of superphosphate. The light top-dressing of nitrate of potash stimulates the growth of the wheat, allowing the farmer to effect an early harvest, and remains as a residue to improve the burn of the tobacco which follows in the summer. The latter is notoriously an exhausting crop, but takes the place of roots as a cleansing course, and is fitly followed by peas as a restorative crop.

I.—WHEAT UNDER IRRIGATION.

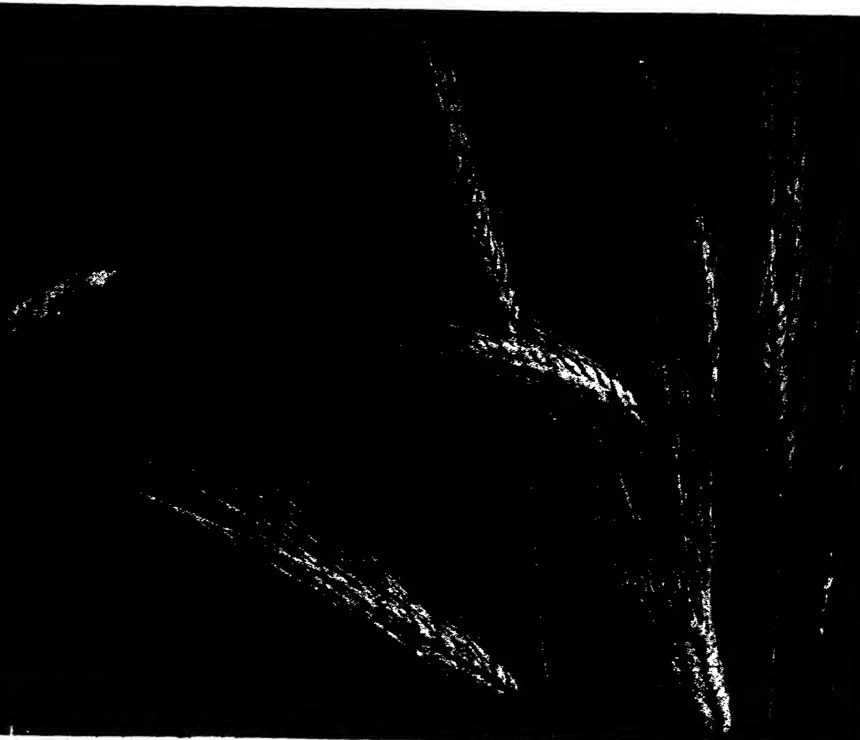
Irrigation and the autumn planting of wheat obviate the problems of rust and drought, which are the alternatives of dry-land cultivation in Natal. If planted during April in our warmer districts and maintained in vigorous development throughout the winter, wheat should attain maturity in October and be harvested before seriously affected by rust, whereas similar crops planted at the same time on unirrigated lands rarely complete their growth before December, and, as will be shown in a following report, do not mature grain to a profitable extent. The selection of types in the former case can therefore be confined to those showing adaptability to the prevailing climatic conditions, and furnishing a heavy yield of grain of good quality. The character of rust-resistance is in this connection of secondary importance.

Classification of Wheat.—The adoption of an approved classification of wheat types and varieties is essential to a clear understanding of the experimental results hereafter reported. Hackel*, who has been generally followed by other investigators, r cognizes three true

* "The True Grasses."

The Prospects for Wheat Cultivation in Natal.

(3) Ears of Marshall's No. 3 Wheat from the 1910 crop, Weenen Experiment Station, Natal.



(4) Ears of Menenieu Wheat from the 1910 crop, Weenen Experiment Station, Natal.

species and eight sub-species of wheat, the relationship of which is shown in the following diagram:—

- Triticum
  - Monococcum, (1) einkorn.
  - Sativum
    - Spelta, (2) spelt.
    - Dicoccum, (3) emmer.
    - Tenax ... ...
      - Vulgare, (4) common wheat.
      - Compactum, (5) club or square head wheat.
      - Turgidum, (6) poulard wheat.
      - Durum, (7) durum or macaroni wheat.
  - Polonicum, (8) Polish wheat.

The relationship between *T. sativum* and *T. polonicum* is closer than between *T. monococcum* and either of the former. *T. spelta* and *T. dicoccum* are distinguished from the other four species of *T. sativum* by the fact that the grains remain enclosed in the glumes or chaff after threshing.*

Einkorn.—As a rule only one grain develops in each spikelet. The spike is compact and bearded. Cultivated in Europe on poor and rough ground unsuitable for common wheat. Used principally for cattle feed, and rarely for bread. Does not cross with common wheat.

Spelt.—Both spring and winter varieties occur which may be bearded or beardless. Yield is not equal to that of common wheat, but it has been successfully crossed on the latter to prevent shattering of the grain at harvest. Spring varieties have proved susceptible to rust both at Cedara and Weenen. The winter types, however, are drought-resistant, hardy, hold their grain very well, and are not subject to the attacks of birds. Like einkorn, it is used almost entirely as stock feed.

Emmer.—Heads bearded, very compact, and flattened; spikelets two-grained; grain harder than in spelt; more resistant to drought and rust; yields a valuable hybrid when crossed with common wheat for dry countries; largely grown in Russia.

Common Wheat.—Is characterized by its capacity to furnish heavy yields of grain suitable for bread-making.

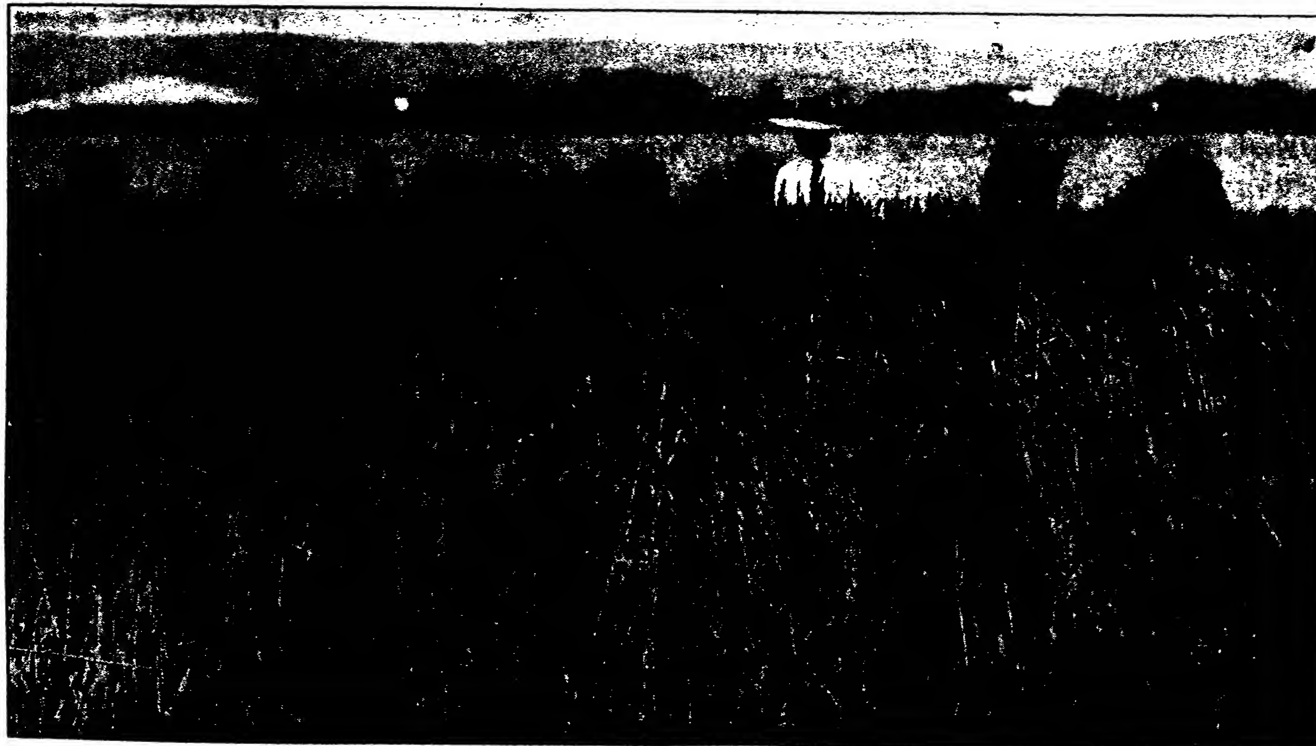
Club or Square Head Wheat.—Head very short and compact; straw very short and stiff; holds grain very well and does not lodge; both spring and winter varieties occur; grain rather soft; winter varieties suited to exposed positions in the warmer districts of Natal.

Poulard Wheat.—Closely allied to macaroni wheat; suitable for hot, dry districts.

Durum or Macaroni Wheat.—Plants tall, with broad, smooth leaves. The heads are heavily bearded, much more so than in any of the ordinary wheats, and the plant has much the appearance of barley. The heads are large and vary in colour from light yellow to almost black, depending upon the variety. The kernels are large, very hard, having less starch and more gluten than common wheat. They vary from light yellow to reddish yellow in colour. The habits of growth of durum wheats adapt them to regions of light rainfall. They have great ability to withstand drought and heat, but require a rich soil, although they are notably tolerant of alkali. In some mild climates durum wheats are sown in the autumn, but generally these are grown as spring wheats. They are used principally for the manufacture of semolina, macaroni, and other edible pastes, being superior

* T. F. Hunt: "The Cereals in America."

The Prospects for Wheat Cultivation in Natal.



(5) A Field of Standard Fife Wheat in 1910, Weenen Experiment Station, Nata

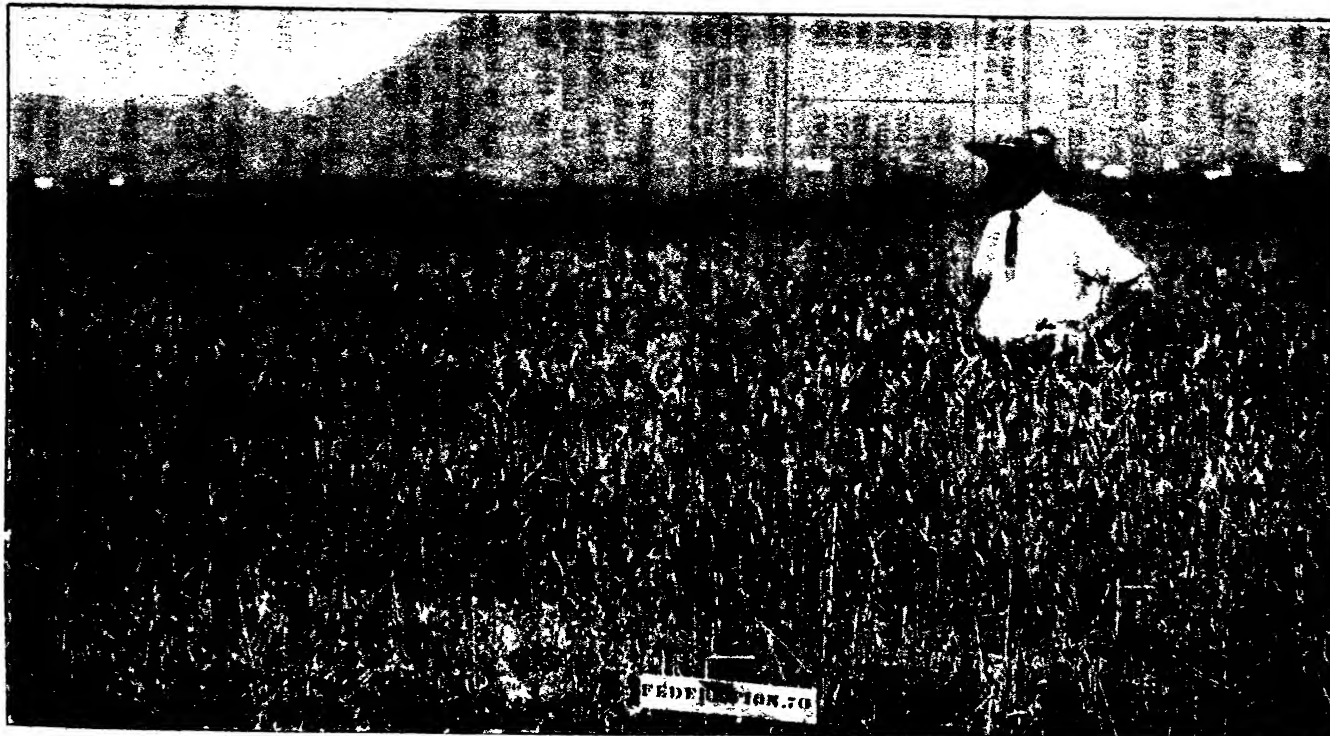
to common wheat for this purpose on account of their high gluten content.*

Polish Wheat.—Spikelets long, with bluish-green glumes; grains long, resembling rye in appearance; heads beardless; not highly productive, but drought-resistant; employed for the production of macaroni, not for bread-making; rarely gives a fertile cross with common wheat.

Selection of Varieties.—As comprising larger or smaller groups of varieties, it should be noted that the above species and sub-species of wheat demand very varying conditions of soil and climate. A recognition of this fact, and the adoption of varieties from other groups than that of the common bread type, may be the means of largely extending the area of wheat cultivation in South Africa. Both in Great Britain and America out-crossing has led to the production of hybrids adaptable to a wide range of climatic conditions and serving a number of cultural requirements. For example, John Garton, of England, and William Farrer, of New South Wales, have successfully crossed common wheat with spelt and emmer to prevent shattering of the grain, for drought and rust resistance, and for cultivation on lighter classes of soil; with club wheat to increase the stiffness of the straw and to prevent lodging, and with durum wheat to give resistance to excessive heat and drought. Where crosses cannot be made directly between two sub-species they may be accomplished indirectly by first producing a hybrid between one type and an intermediate type. In other cases the out-types have been bred without hybridization, and improved out of knowledge by consistent selection. Thus emmer has been found well adapted to cultivation in the Northern States of the Plains, U.S.A., and is grown in Canada. Club wheat has been adopted in the Pacific Coast States, and those Rocky Mountain States where the wheat stands in the field for some time after it is ripe and is cut with combined header and thrasher. Poulard wheat is grown chiefly in the hot, dry regions bordering the Mediterranean and Black Seas. Durum wheat comes principally from Russia and Algeria, and is more largely grown in Spain than any other type. It has also been generally adopted in South and Central America, whence it has found its way into Texas under the name of Nicaragua wheat. Another variety has been grown successfully in parts of the North-West and Canada under the name of Wild Goose.†

Spring and Winter Wheats.—Many of the failures in experimental wheat cultivation in the Colonies may be attributed to ignorance of the seasonal requirements of the new varieties. It should be clearly recognized that spring and winter wheats require that their respective planting seasons be observed. It is true that winter wheat may be changed to spring wheat, and vice versa, but this process requires a period of at least three years, during which yields will be very unsatisfactory.‡ With the exception of emmer, which is essentially a spring type, all species and sub-species of wheat include spring and winter varieties, and before casting any newly introduced

* Nebraska Experiment Station: Bulletin No. 78.
† T. F. Hunt: "The Cereals in America."
‡ M. A. Carleton: "The Basis for Improvement of American Wheats."



(6) A Stand of Federation Wheat in 1910, Weenen Experiment Station, Natal.

form care should be taken to ascertain whether the correct season of planting has been observed. In Natal the problems of rust-infection and the prevalence of a heavy summer rainfall lend greater value to wheats of winter type.

Milling Wheats under Trial at Weenen.—During the past five seasons an effort has been made at Weenen to select a winter wheat capable under irrigation of meeting a large local demand for a milling grain of good strength to replace imported Australian consignments. The following tables reflect the immediate results which acclimatization of the newly imported varieties has largely enhanced:—

RESULTS OF VARIETY TESTS OF MILLING WHEATS UNDER IRRIGATION AT WEENEN, 1907, IN LB. OF GRAIN PER ACRE.

Variety.	Date Planted.	Date Harvested.	Yield of Grain in lb. per acre.
Menenieu (Italian)	22nd May, 1907...	14th November, 1907	1620
*Barley Wheat (Indian)... ...	22nd May, 1907...	15th October, 1907...	1290
Standard Fife (Canadian) ...	4th June, 1907 ...	14th December, 1907	750
Selina (Italian)	22nd May, 1907...	13th December, 1907	510
Wellman Fife (American) ...	23rd May, 1907 ...	13th December, 1907	505
Nicaragua (Durum)	22nd May, 1907...	14th November, 1907	420
Wellman Fife (Transvaal) ...	24th May, 1907 ...	13th December, 1907	150

* Botanically, a hull-less or naked barley (*Hordeum nudum*), used for bread-making in northern India and the Mediterranean area.

Manures applied per acre were 120 lb. double superphosphate and 20 lb. nitrate of potash drilled with seed, and a top-dressing of 80 lb. nitrate of potash six weeks after dress'ng. Delay in delivery of seed postponed planting by five weeks, and yields would undoubtedly have been heavier in all cases, and particularly in that of Standard Fife variety only planted in June, had it been possible to complete this operation, as originally intended, in the first fortnight of April.

Menenieu Wheat.—The field report of this type shows it to be a stout, leafy plant of vigorous growth, standing 5 feet 1 inch in height when matured, and, in spite of lateness of season, little affected by rust (35 per cent.). Development is rapid, ranking in this respect with the Central American variety, and surpassed only by the barley wheat. Bearded.

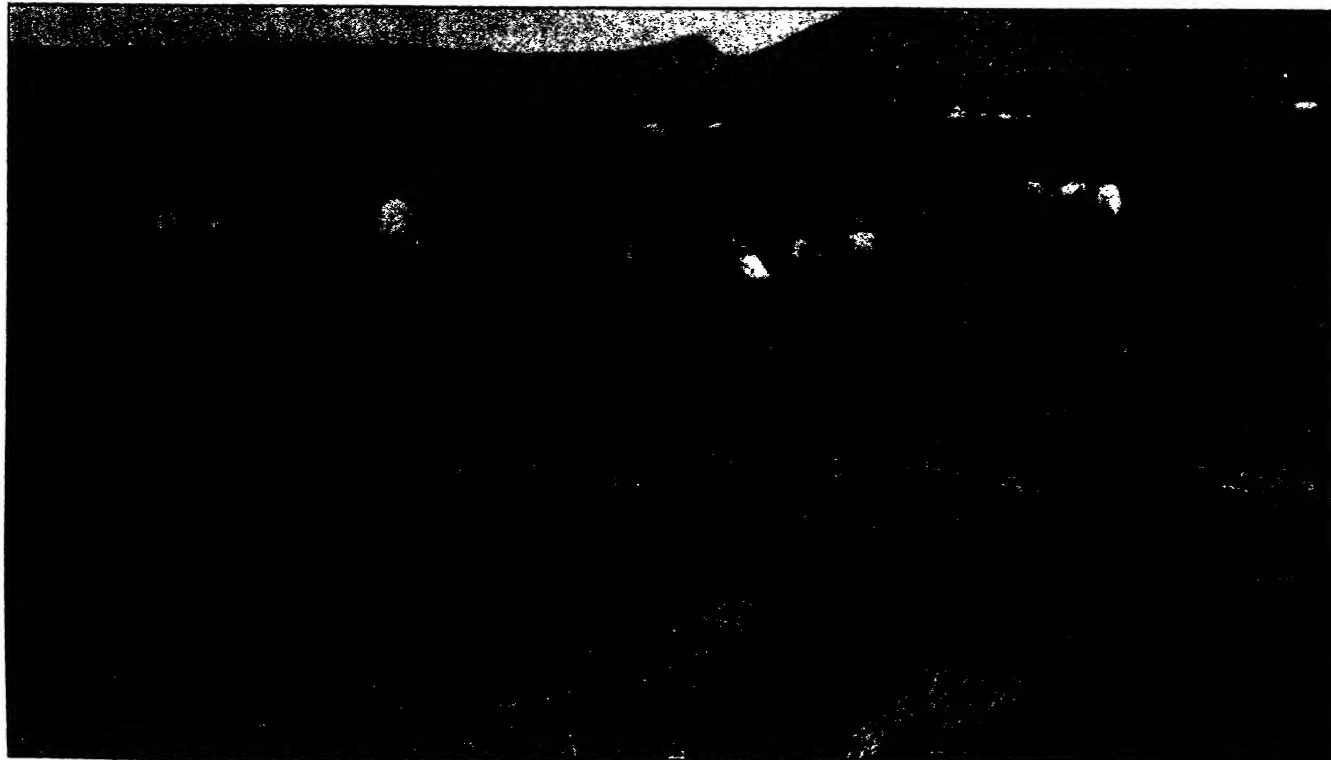
Barley Wheat.—Less stout than the above and apt to lodge in high winds. This feature seriously diminished yield, which should otherwise have been very heavy. Growing period is short, the crop maturing in the middle of October. Almost free from rust (5 per cent.). Growth in height 4 feet 2 inches. Beardless. Not a good bread type, but can be blended with strong wheats.

Standard Fife.—A very vigorous, stout grower, almost free from rust in December (15 per cent.), lodging little or not at all even in high winds. Holds its grain well. Growth in height 4 feet 3 inches. Beardless. Excellent bread type.

Selina.—A weak grower, fine-strawed, and lodging in exposed positions. Coloration a light yellowish green. Apparently little adapted to local conditions. Fairly rust-resistant (25 per cent.). Semi-bearded.

Nicaragua.—A strongly growing, leafy type, with good resistance to rust (10 per cent.). Growth in height 4 feet 9 inches. Yield very disappointing. A good macaroni wheat. Bearded.

Wellman Fife.—A strongly growing type, with somewhat scanty leaf development. Does not lodge and holds grain well. Medium rust-resistance (15 to 20 per cent.). Yield very disappointing. Semi-bearded.



(7) General View of Wheat Plots at the Weenen Experiment Station, 1910.

From the first season's results the Menenieu, Standard Fife, and Barley wheats were selected for further trial, to which were added five highly commended Australian varieties, and the following results were secured:—

VARIETY EXPERIMENT WITH MILLING WHEATS AT WEENEN, 1908.

Variety.	Date Sown	Date Harvested.	Yield of Grain in lb per acre.
Menenieu (Italian)	28th April, 1908...	28th October, 1908...	2100
Federation (Australian)... ...	4th June, 1908 ...	9th November, 1908	2014
Barley Wheat (Indian)	27th April, 1908...	8th October, 1908 ...	1709
Marshall's No. 3 (Australian) ...	4th June, 1908 ...	9th November, 1908	888
Standard Fife (Canadian) ...	28th April, 1908...	28th November, 1908	689*
Yandella King (Australian) ...	4th June, 1908 ...	9th November, 1908	513
Nhill (Australian)	4th June, 1908 ...	9th November, 1908	250
Dart's Imperial (Australian) ...	16th June, 1908...	9th November, 1908	200

* Much damaged by birds
No manures were applied to this crop, but residues were available from the preceding dressing.

Federation Wheat.—It will be noted that a further delay in delivery of the seed postponed planting of the new Australian varieties until the beginning of June. The results obtained from the Federation wheat were the more remarkable, as the yield should have been even heavier with April planting. This variety shows a short, hardy, rust-resistant plant with large, well-filled, beardless ears which are carried on very short, stiff straw. The growing period is nearly eight weeks shorter than in the case of Standard Fife, a point of considerable importance in the climate of Natal. The stiffness of the straw is also a great advantage in view of the storms which are frequently experienced during the spring months.

Owing to a shortness of labour at this station the Standard Fife plot suffered heavily from the attacks of birds, and the grain harvested probably hardly represented half the actual crop. The Italian Menenieu wheat headed the list of yields in both years, but was closely followed by the late-planted Federation in the second season.

Milling Qualities of Wheat under Trial.—While a heavy crop will appeal to the farmer, the quality of the wheat raised will command the attention of the buyer and, incidentally, determine the value of the harvest. Sight should, therefore, never be lost of the object of cultivation which is to supply grain meeting the requirements of the miller and baker. "Sooner or later the high-yielding variety of wheat without quality will make way for the high-yielding variety with quality."* As a complement to field returns a brief milling report was consequently obtained from the Natal Mill and Elevator Company, to whom nine bags of each of the selected varieties from the first year's trial were sent for this purpose:—

"Our miller now reports on your three samples of wheat. In order of merit they are placed as follows:—Standard Fife, Menenieu, Barley Wheat. Their milling properties are briefly as follows:

> "Standard Fife.—A very good milling variety, giving a flour equal in colour to best Canadian wheat, although not quite so strong, that is to say it contains rather less gluten than Canadian wheat.

* L. G. Williams: Ohio Bulletin No. 165.

(8) Bobs Wheat in Stook. Weenen Experiment Station, 1910.

"Menenieu.—Also a good milling variety, giving a nice white flour, but containing less gluten than Standard Fife, and consequently not so favoured by bakers who wish a large loaf.

"Barley Wheat.—Is not a favourite with millers. Is difficult to mill owing to its flinty nature. Would give a fair return of flour, but this would be of poor quality. A loaf of bread made from this wheat would be very small and flavourless."

Gluten and its Function.—In explanation of the above report the following brief description of gluten and its function may not be out of place. The wheat grain is a simple, one-seeded dry fruit with a thin, membraneous pericarp or coat adhering to the seed, so that coat and seed are indistinguishable. The grain has a deep in-folding of the pericarp opposite the embryo, which renders the roller process of milling necessary to the best results and the complete removal of the bran. The embryo may be divided into a scutellum or absorbing organ which, on germination, digests the starch of the endosperm and carries the food substances to the second or vegetative portion, which includes the first leaves and roots of the new plant. The embryo contains a large proportion of proteid matter and fats and a considerable amount of sugar, but no starch.

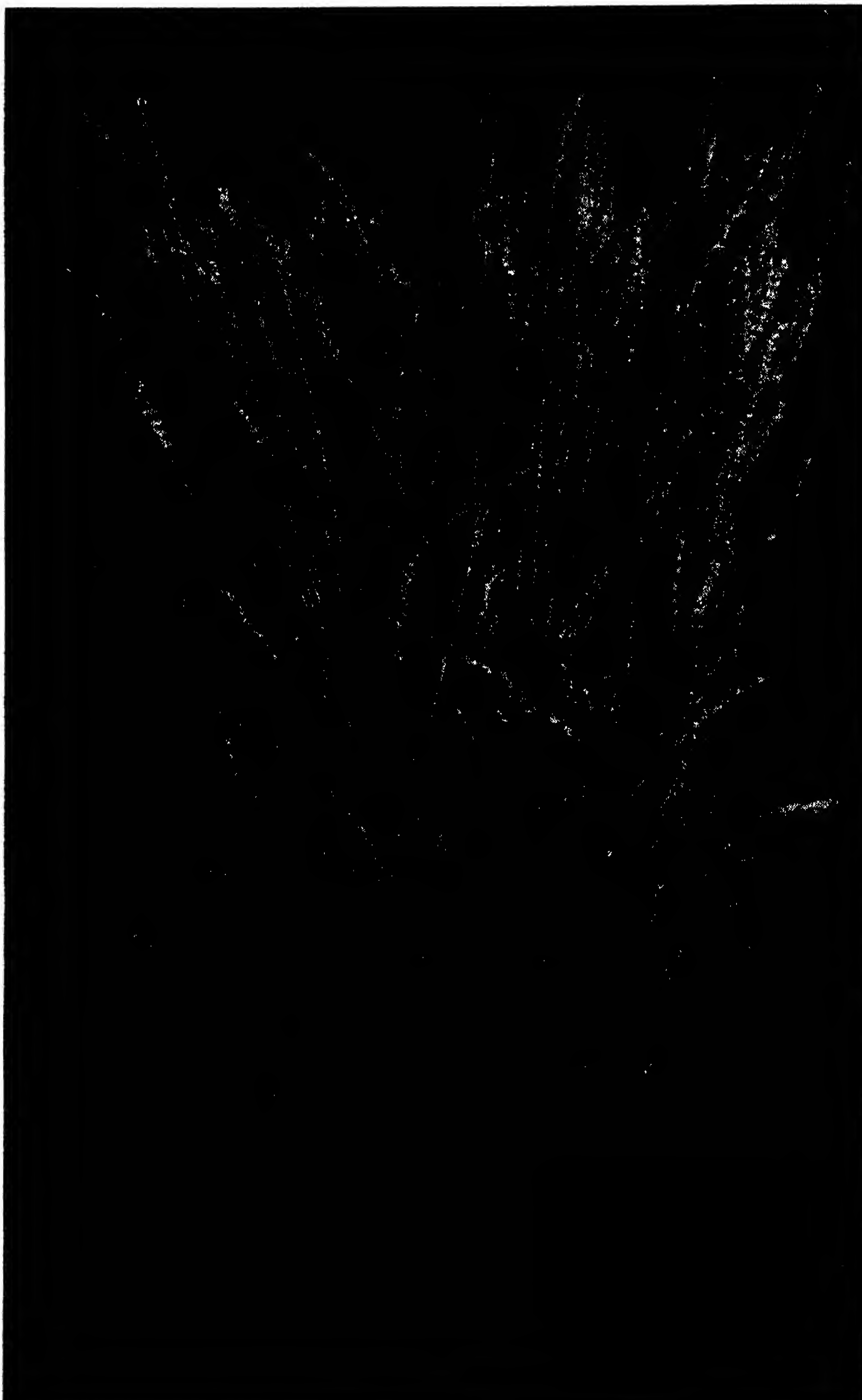
The endosperm. which forms the bulk of the grain, consists of thin-walled cells filled with starch granules varying in size and form, and contains a proteid or nitrogenous substance called "gluten".

The aleurone layer, which is a single layer of large, square cells, encloses the endosperm and embryo and contains aleurone grains rich in protein.

The bran, which encloses the aleurone layer, consists of several layers of cells representing the testa or seed coat and the pericarp, which is really the fruit coat.

Wheat and rye flour are the only two cereal meals which form a dough when mixed with water. This dough, when leavened and baked, produces porous bread. The porous character is due to the gluten found in the endosperm, which, with water, forms a sticky medium imprisoning the carbonic acid gas caused by the fermentative action of the yeast. The gas expanding during baking causes the bread to "rise" or become porous. The amount of gluten and its quality determine the baking qualities of the bread. A good gluten has a light yellow colour, is tenacious and elastic, while poor gluten is dark in colour, sticky, but not elastic. Gluten can be extracted from the dough by repeated washing, which removes starch and non-gluten compounds.

Nitrogen in Wheat.—As Dr. Wiley, Chief of the Bureau of Chemistry of the United States Department of Agriculture, has stated, "It is generally conceded that the value of a wheat for milling and bread-making purposes depends more largely upon its nitrogen content than any other". The nitrogenous or proteid substances, however, present in the grain of wheat include not only the gluten found in the endosperm, but also the aleurone grains in the single layer of large cells surrounding the endosperm and some of the cell-contents of the bran. Of these the gluten alone determines the strength or the value of the flour, and while, "as a general rule,



(9) Fair average sample of Federation Wheat from the 1910 crop, Weenen Experiment Station, Natal.

wheats which contain the largest amount of nitrogen produce the most nitrogenous flours, the total nitrogen in the wheat cannot always be taken as an index of that in the flour".* We are consequently concerned, when breeding and cultivating wheat, principally with the problem of securing a high content of gluten of good quality, combined with a heavy acreage yield. Seasonal variations in composition should be carefully distinguished from variety characteristics, for climatic conditions which favour high gluten formation tend to low bushel weight and a light acreage yield. The following table reflects the character shown by varieties under trial at Weenen during the first two seasons:—

GLUTEN CONTENT AND BUSHEL WEIGHT OF WHEATS GROWN UNDER IRRIGATION AT WEENEN, 1907-08.

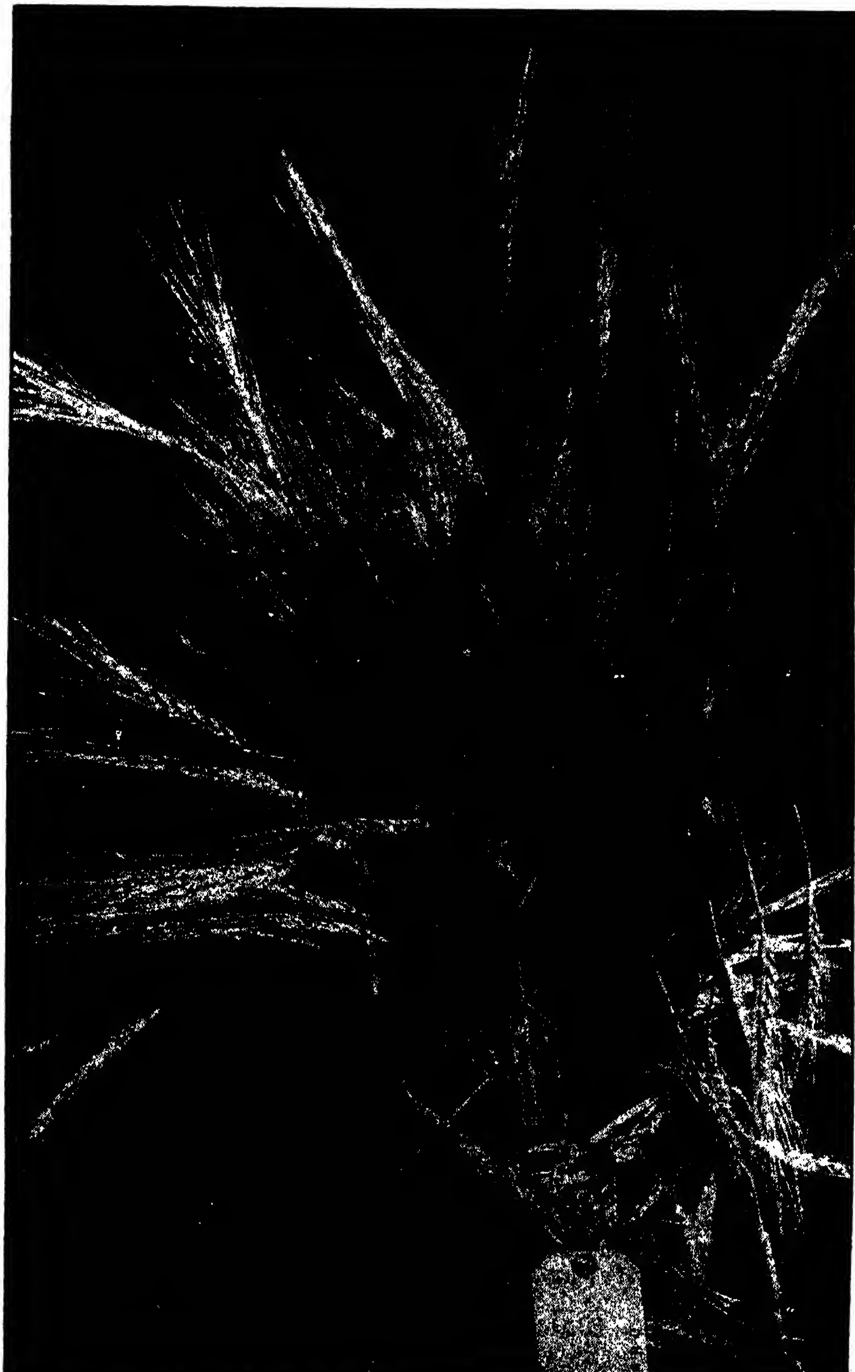
Type.	Variety.	Gluten Content. 1907. Wet.	Gluten Content. 1907. Dry.	Gluten Content. 1908. Wet.	Gluten Content. 1908. Dry.	Bushel Weight. 1907.	Bushel Weight. 1908.
Tuscan ...	Menenieu	25·08	8·36	23·63	7·07	61·9	60·5
	Selina	28·93	9·54	—	—	60·6	
Indian ...	Barley Wheat	32·82	10·87	30·46	10·18	58·9	58·7
Fife ...	Standard Red Fife	31·50	12·00	30·43	10·22	61·2	60·6
	Wellman's Fife...	32·87	10·55	—	—	59·5	—
	Transvaal Fife	30·56	9·76		—	57·5	—
Durum ...	Nicaragua	38·62	12·85	—	—	62·5	—
Australian ..	Federation	—	—	32·05	10·58	—	62·6
	Marshall's No. 3	—	—	33·25	11·23	—	58·7
	Yandella King	—		30·62	10·80	—	59·7
	Nhill			31·08	11·66	—	57·0
	Dart's Imperial...		—	28·65	10·21	—	59·8

It will be noticed that while average yields in the second season were uniformly higher, despite the fact that no direct dressing of fertilizer was afforded, the gluten content and bushel weight of the three selected varieties were in every case lower. The relative superiority of the Fife wheat over the Italian type is, however, maintained as a variety characteristic. Reference to the miller's report shows that, notwithstanding its high gluten content, the flinty character of the barley wheat discounts its milling value. The Tuscan wheats, on the other hand, are remarkably easy to mill, but lose favour on account of their low gluten content. The Fife varieties rank as "fair to mill", while the Durum wheats (represented by the Nicaragua variety in this experiment) are the most difficult.

Williams suggests† three methods of procedure for uniting high protein content with high-yielding qualities:—(1) The hybridization of high protein and high-yielding varieties; (2) the selection of plants testing high in protein from varieties already excelling in yield; (3) the improvement of varieties uniformly high in protein content by systematic selection for high yield. Experience will have to determine the best method. In the Menenieu variety we have an easily milling wheat which, when grown from acclimatized seed, has been found

* H. Sugden: "Chemistry of Plants and Animal Life."

† *Op. cit.*



(10) Fair average sample of Menenieu Wheat from the 1910 crop, Weenen Experiment Station, Natal.

capable of yielding a return of 35 bushels without direct manuring. Crossed with an improved bread type, such as the Red Fife, Federation, or Bobs, this should afford a hybrid worthy of general adoption, to which object the past two seasons' operations have been directed.

Experiments in 1909-10.—The Weenen Experiment Station is unfortunately situated in an area which is almost annually swept by hailstorms, and continued variety experiments in 1909 and 1910 were vitiated, so far as comparative figures are concerned, by considerable hail damage sustained while the crops were in ear. Tabulated results of actual yields for the seasons in question would therefore be neither satisfactory nor reliable. It was observed, however, in 1909 that the tardy development of the Red Fife wheat again subjected the crop to virulent rust-infection, to which it entirely succumbed in the following season, the yield of grain being negligible. On the other hand, the Federation wheat took a strong lead in 1909, with Menenieu in the second place, and both Bobs and Marshall's No. 3 showed good promise. In the latter year Bobs took first place in point of grain yield, with Federation second, Marshall's No. 3 third, and Menenieu fourth.

A number of carefully selected American types, including Rural New Yorker, Early Red Chief. Silver Sheaf Longberry, Jones' Paris Prize, and Jones' Mammoth Amber, proved completely sterile in both seasons.

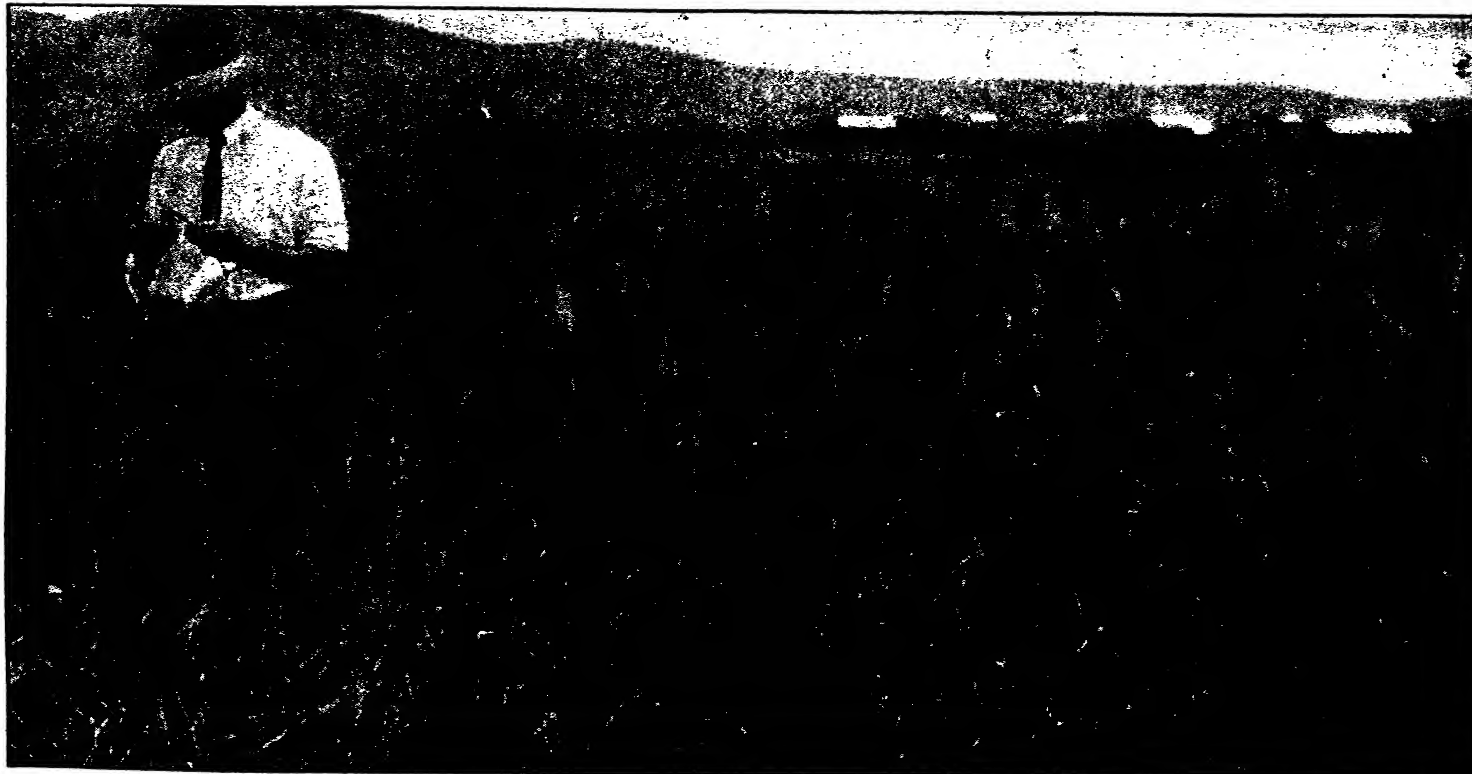
Quantity of Seed Experiment.—Considerable doubt apparently exists among wheat growers as to the optimum quantity of seed for a maximum yield of grain, actual practice showing variations of from 40 lb. to 80 lb. per acre. In 1910 an experiment was made at Weenen with a view to securing evidence on this point. Acre plots of Federation and Bobs wheat were planted with 30 lb., 50 lb., and 70 lb. of seed respectively, which was sown in 9-inch drills. In both cases the heaviest crop was obtained from the largest quantity of seed, though the returns throughout reflect the results of hail damage.

QUANTITY OF SEED TEST.

Variety.	Quantity of Seed.	Planted.	Harvested.	Yield of Grain.
	Lb.			Lb.
Federation ...	30	12th May, 1910 ...	4th November, 1910	316
	50	" ...	"	590
	70	" ...	"	710
Bobs	30	" ...	31st October, 1910...	411
	50	" ...	" ...	561
	70	" ...	" ...	640

It is to be noted, however, that both types are tall, erect, compact-growing varieties, which stool only moderately, and it is probable that with spreading, leafy, and freely stooling wheats the figures might be reversed.

Experiments in 1911.—At the time of writing all types of wheat selected for continuous trial are giving promise of an exceptionally heavy crop at the end of October or beginning of November. Bobs and Federation retain their early maturing character, with the former slightly leading in this respect, casting discharged anthers within

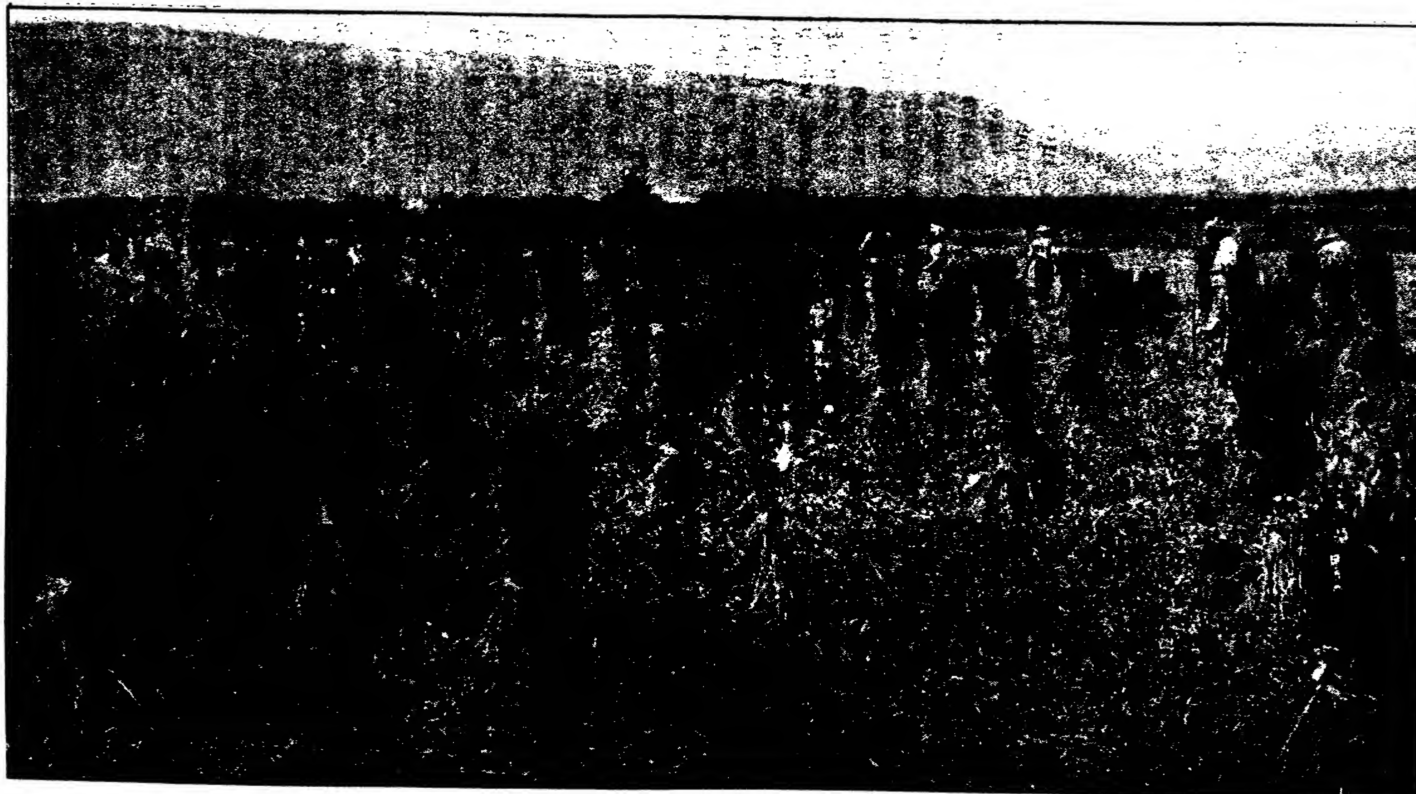


(11) Menenieu Wheat, showing hail damage, at Weenen, 1910.

thirteen weeks from planting. No trace of rust on any type has been detected to date, and all crops during the previous year, with slight exception in the case of Menenieu, were harvested without sign of infection.

Three new hybrid types, being crosses of Menenieu with selected Australian varieties, have made remarkably satisfactory development, and show in vigour of growth and conformation of ear a marked advance in every case on the parent forms.

(To be continued.)



(12) Marshall's No. 3 Wheat at Weenen, 1910.

The Treatment of Redwater in Cattle with Trypanblue.

By Dr. Arnold Theiler, C.M.G., Acting Director of Veterinary Research.

I.

In the year 1909, Professor Nuttall, of Cambridge, in conjunction with Mr. Hadwen, published in "Parasitology" a paper on "The Successful Drug Treatment of Canine Piroplasmosis, together with observations upon the effect of drugs on Piroplasma Canis". The authors stated that Trypanblue and Trypanred are highly efficient remedies in the treatment of canine piroplasmosis, exerting a direct and observable effect upon the parasites and causing the temporary disappearance of the parasite from microscopic observation in the peripheral blood. The efficacy of the new treatment was soon afterwards tested in South Africa by Mr. Jowett in Capetown, who used one of the drugs—Trypanblue—and was in a position to corroborate the statement of the two discoverers. At the Bacteriological Institute at Onderstepoort, Dr. K. F. Meyer undertook the testing of Trypanred on dogs artificially infected with the disease, but found that this drug was not so effective as expected. Botelho, working at the same institute with Trypanblue, also obtained very satisfactory results. Ever since the first publications concerning the efficacy of the new treatment were circulated in South Africa, Trypanblue has been applied throughout the subcontinent, both by veterinary surgeons and laymen, on a very extensive scale, and there is at present a unanimous consent that the Trypanblue treatment is undoubtedly a specific for biliary fever of dogs, and in most instances is attended by good results.

In the same year (1909) Nuttall and Hadwen undertook some experiments in order to study the effect of the drug treatment on cattle suffering from bovine piroplasmosis. These experiments refer to cattle inoculated with South African redwater, the virus of which I had sent to London in the year 1904 by means of blue ticks collected off a calf at a time when it showed the piroplasms in its blood. In London Mr. Stockman passed the strain of redwater through a number of animals, and this particular strain has served for the immunization of a considerable number of English cattle destined for exportation to South and East Africa. With this strain Nuttall and Hadwen inoculated nine animals, using 30 c.c. of virulent blood, four to act as controls and five to be submitted to treatment. The treatment consisted in an injection of 130 to 200 c.c. of a saturated watery (cold) solution of Trypanblue with which four cows were injected into the jugular vein and one subcutaneously. Of the four control animals, two showed haemoglobinuria (redwater), of which one died. Accordingly the virulency of the redwater strain was demonstrated.

Of the treated animals all five showed haemoglobinuria (redwater), which appeared in four on the day the animals were treated, but before the injection of the drug. In one cow the red urine was noticed 24 hours after the injection of the drug. The duration of the passage of red urine lasted in these five cases 12, 24, 36, 48 hours, and 5 days respectively. All five animals recovered. Of the treated cows the Trypanblue was injected in one instance on the same day when the parasites were first noticed in the blood; in two instances one day later, and in two instances two days later. The striking result was that the parasites disappeared from the blood stream for the next four days, and were found only in scanty numbers after some days had elapsed or were even not found at all.

Accordingly, Nuttall and Hadwen rightly drew the conclusion that Trypanblue promised to be an efficient remedy for bovine piroplasmosis, and that the drug produces no ill effects upon cattle.

In the same year Stewart Stockman published his results of the new drug treatment for redwater in cattle. In one series of experiments, comprising 21 animals, 17 were treated and 4 acted as controls. Of the 17 animals 14 were either on the point of passing red urine, had just begun to pass it, or had been passing it only for a short time before the Trypanblue was injected; in the other case the treatment was started 24 hours before red urine appeared. Accordingly, Stockman's cases would refer to what can be clinically diagnosed by every farmer as "proper redwater". Of the untreated control animals none had shown red urine, and these animals were not treated because they did not develop severe symptoms. Red urine was voided for 1 day in 1 case, for 2 days in 5 cases, for 3 days in 3 cases, for 4 days in 2 cases, and for 5, 6, and 8 days respectively in 3 other cases. Stockman also recorded the fact of an early disappearance of the parasites from the red cells in the peripheral blood. In thirteen of his cases he noticed subsequently blood lesions indicated by the presence of basophile and nucleated cells. None of the animals died. In another series of experiments with three animals, Stockman decided to inject the Trypanblue at the beginning of the reaction. Two of the treated animals had not shown piroplasms before the drug was injected. None of these animals showed redwater. In these two animals the piroplasms were not seen at the usual time after inoculation, but appeared later and in rare numbers; the blood lesions were only noticed in one of the two animals.

This last experiment is particularly interesting, as it shows again that the treatment does not completely clear the piroplasms out of the system. Stockman's experiments support the conclusion of Nuttall and Hadwen that Trypanblue has a marked effect on bovine piroplasmosis (redwater). He thinks that Trypanblue may be made use of with advantage in connection with the immunization of cattle against redwater in order to control the reactions and to render the process of immunization more regularly mild.

II.

To these records, the details of which are of great importance, I am in the position to add some of my own which will support the favourable opinion so far expressed of the value of Trypanblue in the treatment of redwater.

2

My cases refer to redwater in imported English cattle, produced in the majority of cases by the inoculation of virulent blood for the purpose of conveying an attack of redwater to the susceptible animal and thereby rendering it immune. One case refers to natural infection brought on by the infestation with blue ticks.

(1) *Sussex Heifer* 936.—18 Months old. Injected on the 28th January, 1910, with 10 c.c. fresh blood of calf 905 immune to redwater and whose blood contained a virulent infection. On the 7th day a slight rise in temperature took place to 103° F.; on the next day the morning temperature reached 102° F.: the blood was examined and one pair of *P. bigeminum* was found. On the 9th day the morning temperature reached 104° F., and the piroplasms were found to be fairly frequent, infecting 2-4 per cent. of red corpuscles. In the course of the 9th day the heifer was injected with 90 c.c. of a 1 per cent. solution of Trypanblue. On the same evening the temperature reached 103° F., and remained at that figure during the following day (10th day). On the 11th day it dropped to 101.2° F. in the morning and continued practically normal for the next few days. On the 10th day all parasites had disappeared and were not found subsequently; no blood lesions were noted.

(2) *Sussex Heifer* 1211.—2 Years old. Was injected on the 20th April with 5 c.c. defibrinated blood from an immune Sussex heifer which had recently recovered from an attack of redwater produced by inoculation. A slight rise began on the 7th day, reaching 103° F. the same evening. *P. bigeminum* was frequently found. The morning temperature on the following day reached 104° F., and the piroplasms were numerous. The animal was also visibly sick, refusing to feed, and black urine was voided. The same day 200 c.c. of a 1 per cent. solution of Trypanblue was injected; in the evening the temperature rose to 106° F. and dropped to 103.4° F. the next morning. The temperature remained at that record during the evening and descended to 102° F. the next day, from which date an almost normal course ensued. The urine was still red the day after injection. Blood lesions in the form of polychromatic and basophile cells were noted in this case.

(3) *Sussex Heifer* 1212.—Injected with a similar quantity of blood as heifer 1211 (see No. 2), and for the same purpose. The evening temperature rose on the 5th day to 105° F., and on the 6th day to 105.6° F. On examination of the blood a few parasites were found. The temperature remained high on the 7th day, and the parasites had increased in numbers. The animal did not feed very well, and was visibly ill. On the 8th day the fever remained at the same height, and the parasites were still present in numbers. A subcutaneous injection of 200 c.c. of a 1 per cent. solution of Trypanblue was now made. The same evening the temperature rose to 106° F. to drop to 103° F. the next morning (the 9th day). It continued to descend during the next two days and reached normal on the 11th day. The day after the injection of the drug all parasites had disappeared; after a prolonged search two *P. bigeminum* were seen on the 18th day. Slight blood lesions in the form of anisocytosis, polychromasia, and basophilia were noted on the 11th day, but they disappeared within a week.

(4) *Sussex Heifer* 1219.—Injected similarly to heifers 1211 and 1212, and for the same purpose. The temperature reaction started

limited. The main object of the agricultural show should be educational; the farmer should be able to learn from the exhibits (1) the need for and means of improving his own crops; (2) the relative merits of new breeds; and (3) where to obtain good seed. One may not realize the need for improvement in seed or in methods until he sees some one else doing better; an agricultural show should be the best place to open the eyes to these things.

A comparison of typical samples of different breeds exhibited at agricultural shows is one of the most effective means of obtaining information in regard to the characteristics of any breed. This is particularly the case if the exhibits are so arranged that a comparison of samples belonging to different breeds can easily be made.

SOILS AND MANURES.

The maize plant has a large stem and leaf surface, and requires a good supply of plant food to sustain it and to develop the large quantity of grain produced. Light, sandy soils, poor in plant food, do not suit it, and soils containing large amounts of incompletely oxidized iron compounds prove unsatisfactory. Fairly heavy clay loams seem to be the best, provided they are not water-logged; the maize plant does not like "wet feet". Its root system is fairly large, and the soil should be deep if good crops are to be maintained.

As General Botha remarked in his opening address, "Continual cropping, without manure, may make the father, but will ruin the son".

Different soils require different manures, but our chemists tell us that bone dust at the rate of about 200 lb. per acre gives very satisfactory results in many parts of the country. On some soils the addition of a little superphosphate to stimulate the young plant, and on many soils the addition of nitrogenous manures, prove a great help; basic slag has given good results in some cases. Before deciding what manures to buy, it is desirable for the farmer to consult the Division of Chemistry of the Department of Agriculture. Do not sow the fertilizer broadcast, but through the "fertilizer attachment" on the mielie planter. One of the chief values of a fertilizer is to hasten the growth of the young plant, which enables it to get its roots down deep before a drought comes on such as we usually get in spring.

Rotation of crops is a valuable method of improving the soil; for further information on this subject the reader is referred to *Farmers' Bulletin* No. 118, which, though primarily written for the irrigation farmer, contains information applicable to dry lands.

TILLAGE.

To the dry-land farmer the tillage and subsequent cultivation of the soil are the most important items in the growing of his crop. As so much has been spoken and written about the importance of deep ploughing for the absorption and retention of moisture, I need only add that in maize growing in South Africa, deep ploughing has been the salvation of the crop in dry seasons; in the cases referred to the ground was ploughed to a depth of 12 and even 15 inches, and still better results were secured where it was sub-soiled to a depth of 21 inches. Steam ploughing for maize growing is being practised

with great success by Messrs. Otto Bros., Otto's Bluff, Natal; Mr. J. Farquhar, C.M.G., Stewart's Park, Ladysmith, Natal; on the Vereeniging Estates, Transvaal; and by Messrs. C. Plange & Co., Westphalia, Zoutpansberg, Transvaal. The advantages of steam ploughing are found in the depth and excellence of the work done, and in the rapidity with which it can be done even in dry weather, thus avoiding the necessity of waiting for "ploughing rains".

PLANTING.

Every crop has its season, and the season varies with the altitude, latitude, and date of arrival of the steady rains. It is essential to success in the growing of maize that we learn by experiment which is the best season for planting in the particular district or part of a district where we are farming. In some parts of the country the season lasts for six weeks or two months; on the high veld of the Transvaal its duration is only about a month, and in other parts of the country it lasts for only about 2 weeks.

Depth of planting is important in dry farming; our experiments show that, with early-planted maize, the best results are obtained where the seed is planted at a depth of 4 to 5 inches. Where the land is very weedy, check-row planting is practised because it allows the cultivators to clean the crop both ways, but it is questionable whether maize should ever be planted in land which is so dirty that it must be cultivated both ways. Maize which is bunched three or four plants together by the check-row system, suffers more from drought than that which is spaced, say, 5 inches apart in the hill, and the hills 3 feet apart. If the land is clean, or moderately so, planting in continuous rows appears to give best results in the long run, and it takes less time and labour than check-rowing. For continuous-row planting the plants should be placed from 1 ft. to 2 ft. in the row, according to richness of soil and amount of rainfall; the poorer the soil and the lower the rainfall the wider the spacing in the row. The same principle applies to the distance between the rows; on rich moist soils the rows may be 3 ft. apart, but in most Transvaal soils 3 ft. 4 in. to 3 ft. 8 in. gives better results. In the drier parts of the country, 3 ft. 8 in. × 2 ft. may be necessary to allow sufficient moisture to produce a crop. In this matter each farmer should experiment carefully for himself, for if the spacing is too wide the crop will suffer; the best results can only be obtained by getting as heavy a stand on the land as it will carry without injury to the individual plants.

Nearly all maize growers now use one or more "planters". Plant straight rows; crooked rows will be decimated by the cultivator. To get straight rows mules or horses are better than oxen; they are also quicker in getting over the ground. To reduce the labour bill, fasten two planters together by means of a two-wheeled carriage to which the planter poles are loosely attached; this requires six mules instead of the four used if they were separate, but only two boys are required instead of four.

CULTIVATION.

The the secret of success in mealie growing on dry lands is to cultivate, cultivate, and keep on cultivating, till the mealies are too

on the 6th day, reaching 103° F. in the evening. *P. bigeminum* was noted on the 7th day. The fever rose to 104° F. in the morning of the 8th day and the parasites were numerous in the blood; the urine was noted to be almost black on this date. During the day the heifer was injected with 200 c.c. of a 1 per cent. solution of Trypanblue. The same evening the fever reached 105° F.; during the night it dropped to 102° F. and returned to normal the following day (9th day). The urine began to clear the day after the injection of Trypanblue. In the course of the succeeding week slight blood lesions were found (anisocytosis, poikilocytosis, polychromasia, and basophilia).

(5) *Sussex Heifer* 1214.—Injected similarly to heifers 1211, 1212, 1219, and for the same purpose. A slight rise of temperature to 103° F. took place on the 6th day. On the same day *P. bigeminum* was found in the blood. The fever rose to 104° F. on the 7th day and parasites were present in the blood in fair numbers. On the morning of the 8th day the temperature rose to 105° F., and the microscopical examination of the blood revealed the presence of parasites in extremely large numbers, almost every corpuscle containing one or more parasites. The animal was very ill and the urine was dark red. On the same day she was injected with 200 c.c. of a 1 per cent. solution of Trypanblue; the same evening the temperature rose to 106.4° F. and dropped subnormally over night, the animal having entered into a state of collapse; it died the same day. The examination of the blood proved the complete disappearance of all parasites, but the red corpuscles showed the lesions of a grave anaemia being distorted and destroyed to a great extent.

Post-mortem Report. The condition was very good. *Rigor mortis* had not completely set in at the time when the post-mortem was made. The flesh had a very pale appearance and the fat deposits were white. In the subcutaneous connective tissue of the shoulder were two large patches of blue infiltrations due to the injection of the Trypanblue. The lungs had not collapsed and were normal, with the exception of a haemorrhagic infarct in the right anterior lobe, reaching the size of an apple, and a consolidated oedematous focus in the left middle lobe. The trachea had a blue-greenish tinge (blue stain). The mediastinal and bronchial glands were normal. The heart contained blood clots in both ventricles, which had a brownish hue; the epicardium showed ecchymoses; the endocardium had a blue-greenish tinge and a suffusion was found in the musculis papillaris of the left ventricle. The liver was slightly enlarged and of a light brown colour; on section it was yellow in colour, had a granulated appearance, and the parenchyma was somewhat friable. The gall bladder contained viscid bile of a brown colour. The spleen was enlarged. It measured 54 cm. in length (21½ inches), and in breadth 15 cm. (6 inches); its weight was 1.76 kilo (3 lb. 2 oz.). The capsule was distended, the pulp was protruding and of a jam-like consistence; the trabeculae were not distinct. The fourth stomach contained only liquid. The folds were swollen, the mucosa was pale and had a greenish tinge; in the pyloric part were some haemorrhagic ulcers. The reticulum was attached to the diaphragm by a connective tissue which, on section, was found to contain an abscess caused by a piece of wire. The omasum contained dry food. The serosa of all intestines had a blue-greenish tinge. The mucosa of the duodenum

and the ileum was slate-coloured and covered with a mucous deposit. The mucosa of the caecum and colon was slate-coloured and showed longitudinal haemorrhagic streaks. The kidneys were almost black in colour, oedematous, and friable. The capsule was easily detached.

Remarks.—This post-mortem examination revealed the presence of very extensive lesions, and the conclusion is justified that the application of the Trypanblue was practically too late. Notwithstanding the disappearance of all parasites, the lesions produced were of such a nature that recovery was impossible. It is remarkable how almost all the internal organs, particularly the serous membranes, were stained by the drug.

(6) *Sussex Heifer* 1215.—Injected as heifers 1211, 1212, 1219, and 1214, and for the same purpose. The first rise of temperature took place on the 5th day to 104.6° F. *P. bigeminum* was observed the next morning. The parasites were frequent on the 8th day when the morning temperature was 104° F. On this day the animal was injected subcutaneously with 200 c.c. of a 1 per cent. solution of Trypanblue. The temperature rose on the same evening to 105° F. and reached 104° F. the next morning, 103° F. the same evening, and returned to normal within 48 hours after injection. The examination of the blood proved the disappearance of all parasites. In the course of the following days, slight alterations of the blood corpuscles were noted. Rare parasites were seen again about three weeks later.

(7) *Sussex Heifer* 1217.—Injected as heifers 1211, 1212, 1219, 1214, and for the same purpose. The first rise of temperature took place on the 6th day to 104° F. in the evening, but no parasites were noted on that date. The following two days the fever maintained about the same height, and parasies were met with very frequently. On the 8th day dark urine was voided. The animal was now treated by the injection of 200 c.c. of a 1 per cent. solution of Trypanblue, injected subcutaneously. The same evening the temperature rose to 106° F.; it dropped over night to 101° F., indicative of a collapse, but continued within normal limits. The animal, although showing symptoms of distress, soon rallied again. The examination of the blood showed the absence of all parasites. Within the subsequent few days, slight blood lesions were noted.

(8) *Sussex Heifer* 1218.—Injected as heifers 1211, 1212, 1219, and 1214, and for the same purpose. From the 6th day the fever rose but never surpassed 104° F. in the evening. The parasites were fairly frequent on the 8th day when the animal was injected with 200 c.c. of a 1 per cent. solution of Trypanblue. In this instance the temperature did not rise higher after the injection, but remained stationary at 104° F. for the next day, to drop to normal after that date. On examination of the blood the day after the injection of the drug, one single parasite was noticed in the slide. No blood lesions were noticed in this instance.

(9) *Sussex Heifer* 932.—Injected as heifers 1211, 1219, etc., and for the same purpose. A slight rise of temperature occurred on the 6th and 7th day. *P. bigeminum* was noted on the 7th day. In the morning of the 8th day the temperature reached 104° F., and the parasites were fairly frequently met with. The animal was now injected with 200 c.c. of a 1 per cent. solution of Trypanblue. The temperature on that night rose to 105.4° F., to descend the next day, and reached

normal limits within 24 hours. On examination of the blood the day after injection, one single parasite was seen in the slide. Slight alterations of the blood were noticed, and, about fourteen days later, a recrudescence of parasites occurred, followed by a slight fever. The animal was not treated, and outwardly showed no signs of illness.

(10) *Sussex Heifer* 940.—This heifer was infested with a considerable number of blue larval ticks, which readily attached themselves and developed in due course. On the 15th day after infestation, the temperature rose and remained between 103° F. and 104° F. on the 16th and 17th days. On the 18th day the morning temperature reached 105° F. The animal was not feeding well on this day; there were, however, only a few parasites in the blood. The same evening the temperature rose to 105.6° F., and to 106° F. on the morning of the 18th day, when piroplasms were more frequently met with. The heifer was now injected with 100 c.c. of a 1 per cent. solution of Trypanblue subcutaneously and 50 c.c. into the jugular vein. The evening temperature dropped below 106.2° F. and continued to descend the next day, falling to 100 F. on the 21st day; normal records were given after that date. Although no red urine was noted, the animal was decidedly ill for a few days and refused all food. She started to feed again on the 23rd day, and commenced to ruminate on the 24th day, from which date a rapid improvement took place. For two days after the injection of the drug the parasites could be noticed in blood smears, but only in rare numbers. The blood lesions were not so marked as one would expect from the ill state of health the animal was in for a few days, but they were nevertheless well pronounced.

(11) *Hereford Heifer* 1179.—Injected subcutaneously with 5 c.c. of blood from an English heifer immune to a pure strain of South African redwater. The fever reaction started on the 9th day, ascending to 105° F. on the 13th day. The parasites were noted for the first time on the 11th day; on the 12th day they had increased in considerable numbers and were very frequent on the 13th day. It was for this reason that the heifer was then injected with 100 c.c. of a 1 per cent. solution of Trypanblue. The same evening the temperature remained stationary at 105° F. The next morning—the 14th day—the temperature was still high, but dropped to 102° F. 24 hours later, reaching normal after another day. The day after the injection the parasites had disappeared. There were but few blood lesions noted subsequently.

(12) *Hereford Heifer* 1182.—This heifer was injected in a similar way to 1179, and for the same purpose. The fever reaction commenced on the 9th day and rose to over 105° F. on the 11th day. On this date *P. bigeminum* was noted. This fact and the high temperature called for the injection of Trypanblue (100 c.c. of a 1 per cent. solution). The next day the temperature had passed 106.4° F. in the morning. It descended the same evening below 105° F. and continued to fall, and reached normal on the 14th day. The day after the injection the animal was looking dull and was not feeding well. The examination of the blood was made and showed the complete disappearance of the parasites from the blood stream. The animal soon rallied. Only a few blood lesions were noticed subsequently.

SUMMARY OF CONCLUSIONS.

The experiments of Nuttall and Hadwen, as well as those of Stockman, are of particular interest to us because they were carried out with a South African strain of redwater. Further, I wish to emphasize the fact that English cattle were exclusively used in all the experiments both in England and South Africa, and amongst these were those treated by Stockman and myself of selected breeding stock. It is true that these animals were comparatively young (between 1 and 2 years old), a fact which is of importance, as younger animals withstand a redwater reaction much easier than older ones. The observations here, however, prove that some of these animals underwent very sharp reactions. Every South African farmer who has ever imported stock from England knows the susceptibility of such stock to our redwater and has experienced losses from this cause. Accordingly, it can be concluded that the drug treatment in the form of the injection of Trypanblue has given satisfactory results. Of 37 animals treated in London and Pretoria, 1 died, and in this case the severity of the post-mortem lesions indicated that the treatment was apparently applied too late.

Amongst the 36 surviving animals, 25 had shown red urine, a symptom which is generally considered to be a serious one, and undoubtedly indicates a grave state of affairs. It is furthermore noted that the injection of the drug in the majority of cases is followed by an immediate increase of fever which is probably due to the destruction of the parasites and the liberation of toxins in the blood plasma. But within 24-48 hours the temperature returned to normal and continued so subsequently. There was occasionally a reappearance of blood parasites, but only in rare numbers, indicating that the drug has not destroyed all parasites, but in no instance did these parasites lead to a relapse of the disease. This fact is of the utmost practical importance. We know that redwater is a disease, the parasite of which remains in the blood after an animal has recovered from a natural attack, and it has been found that when the parasites have finally disappeared the animal is liable to a reinfection. Accordingly, since Trypanblue does not kill the parasites in the blood a lasting immunity must result. This was borne out by experiments. Most of the heifers treated by Stockman and by myself were later exposed to tick, viz., veld infection and all of them have proved to be immune. Accordingly, in Trypanblue we have a useful drug, which will enable us to control and reduce the danger resulting from the artificial immunization of imported cattle against redwater, and, like Stockman, I consider that herein lays the advantage of the drug treatment. When, under the condition of the practice, a farmer notices an animal to be suffering from redwater, we may safely say that, in a great many cases, an interference comes too late. The one case of mine produced by tick infestation indicates that a speedy interference will lead to recovery, but very few animals would be under such close observation, and even my heifer, notwithstanding the immediate application of the drug, was very ill.

A warning must be given here, the neglect of which might lead to serious losses. For the purpose of obtaining blood to produce redwater in a susceptibe animal, an immune animal is necessary. It is true that, in redwater infected areas, almost every bovine born

and bred there contains *P. bigeminum*, and the injection of such blood invariably brings on redwater in susceptible animals; but such animals, in the majority of cases, contain other parasites, one of which, described by me as *Anaplasma marginale* and considered to be the cause of gall-sickness in imported cattle, does as much, if not more, harm than *P. bigeminum*, and cannot be successfully dealt with by the Trypanblue treatment. Indeed, in my first experiment I noticed a mortality of 50 per cent. in the imported cattle.

Accordingly, care must be taken to exclude this second parasite. This, however, is not work for a farmer, as much technical knowledge is required. We have arranged that imported animals with a pure infection of *P. bigeminum*, i.e. redwater, are kept in the premises at Onderstepoort Laboratories, and arrangements will be made to stable others at the Grahamstown Laboratory, from which places pure blood for the injection of imported cattle can be obtained. How to overcome the difficulty of the anaplasmosis, or the gall-sickness, will be dealt with in a future article. Generally speaking, the drug treatment should be made use of in all cases of redwater; there is no other treatment which will give equally good results. The one disadvantage of the treatment lies in the fact that on the site of the infection frequently an abscess is found, succeeded by sloughing of the skin. The injection is succeeded by a blue-greenish discolouration of the skin which will gradually disappear. Since in South Africa, cattle dying from any disease are excluded for human consumption, nothing stands in the way of the use of Trypanblue. To judge from our experience it did not matter much for the native.

In order to minimize all risks, it is advisable to boil the water and use it after cooling before the solution of Trypanblue is made. For every 100 c.c. of water, 1 gramme of crystals is dissolved (15 grains = 1 gramme, 28 c.c. = 1 oz.). About 100 to 200 c.c. of this solution should be injected according to the size of the animal. The medicine causes apparently no harm. In severe cases an intrajugular injection may be indicated which should be carried out by injecting the liquid under slight pressure into the vein. Similar to all surgical operations, care is necessary, and accordingly the syringe should be properly sterilized, and also the site of injection should be cleansed and disinfected.

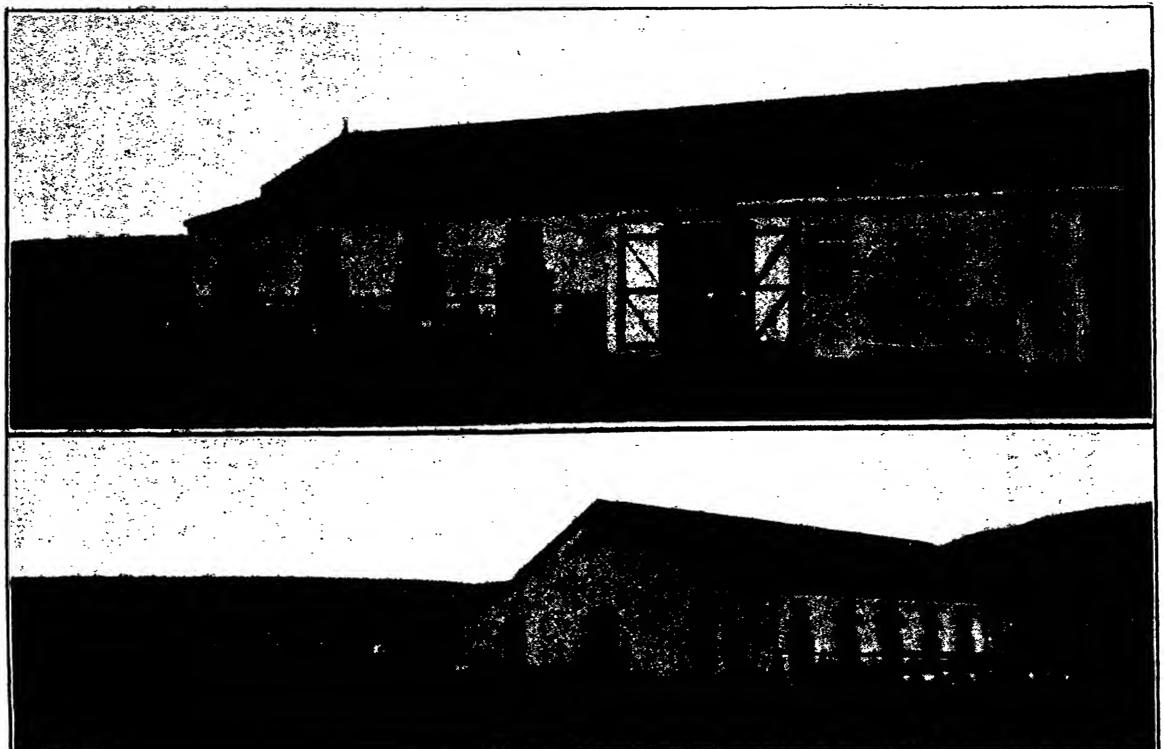
Some of our readers may not know of the use of trypanblue for the treatment of biliary fever in dogs, and for their information it may be stated that the same drug in the same concentration is used for subcutaneous injection. The dose varies between 5 to 15 c.c. for small and large dogs. One injection as a rule suffices.

The Wool Industry of South Africa.

MACHINE SHEARING AT COLESBERG.

The advantages of machine-shearing over hand-shearing are so many and manifest that they call for no special pleading in these days. Yet the adoption of the machine-shear in the South African wool and mohair industries seems to be a plant of exceedingly slow growth. Several attempts have been made to push this matter at a quicker pace, but the resistant powers of the country generally seem to baulk most of the efforts just when they look most promising. One notable effort was made in the Eastern Districts of the Cape Province a couple of years ago, when an up-to-date portable power plant with skilled shearers was introduced and flocks were shorn by contract most satisfactorily. That venture lasted exactly one season—if recollection does not play the writer false—and nothing has been attempted since on the same lines, although an elaborate scheme was talked about by which the system would have been widely extended. The main facts of the situation would appear to be that in the present general condition of the wool and mohair industries the more extended application of this undoubtedly advantageous method of winning fleeces does not commend itself to the average farmer for reasons of economy. The principal reasons for this are that the hand-shearers, such as they are, of this country are cheaper workers—taking fleece for fleece produced—than the machine-shear. This is undoubtedly a great stumbling-block in the way of the installation of the machine. The next trouble is the non-existence, except in very few cases, of flocks of sheep or goats sufficiently numerous to justify the outlay. While a third reason is the lack of skilled men to handle the machines when they are erected. Against these facts we have the many admitted advantages, not the least being the superior manner in which a machine-shorn clip can be sent to market and the rapidity with which a large flock can be handled as compared with the time taken to do the same work by hand.

The pressure of the rapidly advancing enterprise in the farm industries of the Union, however, seems likely to prove a powerful factor in the solution of this problem, for in more than one section of the country where fleeced animals form the staple product the question of labour is reaching the acute stage. In such conditions the most trying period is naturally the shearing season, for not only is more labour specially required then, but it needs to be of a more or less skilled or specialized character. This means that the day is not far distant when the existing economic conditions must change. The hand-shearers of to-day may be willing to work for a small sum per animal shorn, but with an increased demand for their labour, and a comparative shortage, that charge must rise. It will, therefore, be as well for the better class farmers to face the position early and take



Outside Views of the Shearing Shed at Oorlogs Poort, Colesberg.

steps to secure themselves against the possible trouble which may ensue. The tendency of South Africa—in fact we may go further and say the crying need of South Africa—is for more and more fleeced animals. Compared to our population we own a high proportion, but compared to the extent of suitable land in the Union we have a rather low proportion—that is if we measure our resources by other countries at all similarly situated. The natural result of such a set of conditions must be the gradual increase in the fleece-bearing flocks of the country. And with the increasing demand for native labour of all kinds the supply of shearers of any capacity does not promise to grow at the same rate. But even supposing it to be possible for the supply of trained hand-shearers to always keep pace with the increase of the flocks there must always arise the other important matter of time in shearing. The machine is rapid, effective, and in the end economical, if only given a fair chance, for it is possible to so organize the work of a sheep farm when it is equipped with a well-arranged wool shed and a complete installation of machine-shears as to effect many other improvements which more than make up for any extra expenditure by the enhanced returns obtainable.

It was the fact that the Colesberg Farms Estates, the property of Sir Abe Bailey, and one of the largest sheep propositions in the country, were found to be facing conditions which had outgrown the ordinary methods prevailing which induced the manager, Mr. M. B. Webb, to turn his attention to this particular question with so much earnestness as to introduce the Lister Machine-Shearing Outfit to the central wool shed of the estate at Oorlog's Poort, some thirty miles from Arundel railway station, in the Colesberg District. The management was faced with the serious task of shearing some 50,000 sheep with nothing more reliable to depend upon than the usual bands of wandering native or coloured shearers. The prospect was far from exhilarating when the alternative was accepted of trying the machine methods. Fortunately a fairly well constructed wool shed on sound modern lines was available for the experiment, so that very little trouble or difficulty was experienced in introducing the installation. The system decided upon was that known as Lister's—the whole plant being the product of Messrs. R. A. Lister & Co., of Dursley, Gloucestershire, England. These plants are well known and highly appreciated in Australia and New Zealand, and are now being introduced to South Africa by Messrs. Adolph Mosenthal & Co., of Port Elizabeth. The plant now installed consists of an 8-horsepower petrol-driven portable engine of a very handy type, together with twenty machine shears worked from shafting running down each side of the shed—ten in each tier. At first only ten shears were set up as a trial, but they were immediately reinforced by another batch of ten, so that there seems little fear as to the ultimate success of the scheme. The whole plant was installed by Mr. R. B. Langworthy, one of the Lister travelling representatives, and as a consequence everything works with great smoothness and reliability. The shearing machines themselves consist of the usual comb-cutters on the well-known principle, worked by a revolving core, connected to the shafting by the usual flexible core and joints. The twenty "stands", as they are called, are of the overhead type of bracket. That is to say the shafting is fitted overhead throughout the shed, and the working connections of the shears or "brackets" are set above. These brackets are placed

The Wool Industry of South Africa.

Interior of Shearing Shed at Oorlogs Poort, Colesberg, showing Wool Table, Shearers at Work, Sheep Pens, etc.

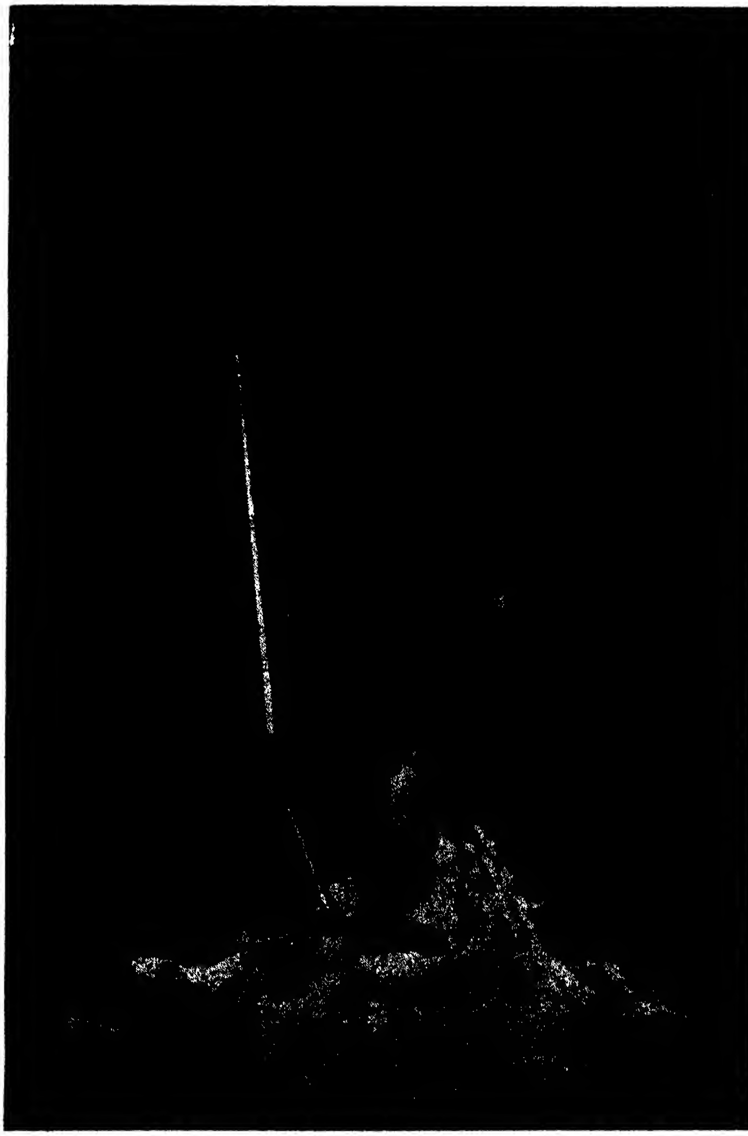
Interior View of Shearing Shed at Oorlogs Poort, Colesberg, showing Wool Tables, Baling Press, etc.

5 feet apart, the shearing machines themselves being actually driven by a friction contact. Each machine is independent and under the control of the operator—in this case the shearer—who can go on or stop his machine as he wishes without at all interfering with the others. The power from the friction contact is transmitted to the machine by means of the flexible core explained above, encased in steel tubing, and provision is made for every possible movement of the tube by means of a spring and tube joint. The shearer has thus the great advantage of being in no way incommoded, and once he has the machine in his grasp can turn it any way he choses without the least inconvenience. Among the other advantages of these machines is the provision made for duplicating every part, as "spares" of every kind are stocked by the agents; but as the very best material is used in their construction there should not be much call for such, outside the ordinary scope of fair wear and tear.

One of the minor difficulties experienced by farmers who have attempted sheep shearing in South Africa on a modified scale with machine-shears of various kinds has been the sharpening of the cutters. In this case full provision is made for this operation by means of a very simple contrivance. Two metal disks are fitted on spindles attached to the engine. Upon the face of these a sheet of emery paper is fixed, one coarse and the other fine. These metal disks are set revolving at a very high rate of speed, and as they revolve the cutters and combs are held against them by means of a magnet on a thin rod, and the dullest is sharpened in a few seconds.

A visit to this up-to-date wool shed in the heart of the Karoo was an interesting and illuminating experience. For here we found the beginning of the solution of some at least of the more pressing problems of the country. Instead of a reeking, high-smelling shed, rich with the aroma of the native shearer in his most perspiry and unpleasant mood, we found none but white men employed. The initial difficulty of procuring a fairly intelligent type of man to undertake the work of handling the machine shears was overcome by the manager offering some of the younger Dutch farmers in the neighbourhood an opportunity of making a little money while the work lasted. The response was fairly satisfactory, more especially as the rates offered were in advance of those usually paid for this kind of work. With the rapidly acquired skill in the use of the machine which several of the shearers soon attained their earnings must have amounted to a very respectable sum. At first, of course, they were strange and unhandy at the work, but they soon began to improve, and by the end of the first week they were putting out as many as sixty sheep per head per diem. This number is of course a mere bagatelle compared to the average output of a skilled Australian or New Zealand shearer, but it is distinctly encouraging to know that the effectiveness of these men was increasing almost daily. Those who saw them at work, and are competent to judge, feel positive that a month at this work will bring them on to the hundred sheep a day scale. The Australasian record is about 280 per diem, but these figures are exceptional.

To return to the work in this particular shed, it was further interesting to see twenty Europeans "with their coats off" hard at it in such a good cause, and to see another dozen or so young Englishmen, pupils on the estate, just as busy helping in the general work of



The Machine Shearer at Work. Photo of a Skilled Young Dutch Shearer.

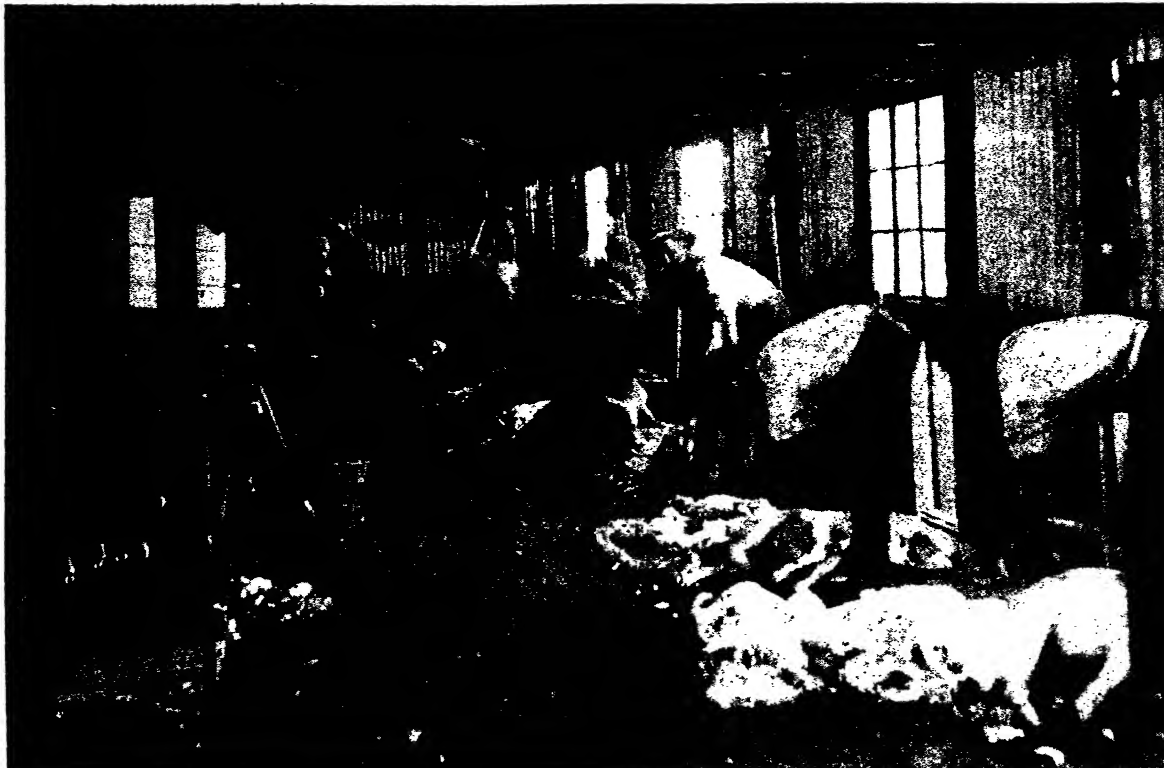
Left Section of Machine Shearers at Work at Oorlogs Poort.

keeping "the board" scrupulously clean. These young fellows also did the work at the wool tables, including classing the fleeces, piece-picking, locking, etc., and the other minor operations of getting up the clip were also performed by them, such as packing and pressing the bales. The scene was a very busy one indeed, and reflected the greatest credit upon all concerned in its organization.

The illustrations herewith give some idea of the interior and exterior of the wool shed, with the whole staff busily at work. The plan upon which it is constructed is very simple, though very effective. The whole building is composed of wood and galvanized iron. Its exact dimensions are not available, but it is roomy and has plenty of capacity for the work to be done. The general scheme seems to be to have a building so constructed as to keep it well above the ground, and thus allow of an open floor for the sheep pens. These, the pens for the sheep awaiting shearing, are in the middle of the building, and as the shearing "board" runs down both sides it is quite handy for the sheep to be passed to the shearers in turn. When the sheep is shorn the shearer slips it out through a small door in the wall at his back to a pen outside, where it awaits with others the return to the flock. This part occupies about half the building, with the shears, say about 50 feet by 40. The other half is occupied by the wool tables, the press, and the other facilities necessary for the get-up of the clip, including a certain amount of storage capacity for the bales as they are completed. At the end of the shed a platform is constructed from which the wool is loaded to wagons for dispatch to the railway. The engine is placed in a lean-to annexe on the principal building, the outer pens running in a line with this.

The wool press is a Ferrier, a well-known Australian make, which turns out a very compact, but rather small, bale—that is small compared to the customary bale of South Africa. A really admirable feature of this work was the manner in which the clip was being "got up". Not only was the most scrupulous care being exercised in seeing that the fleeces were carefully and properly locked, but every class of wool was baled separately and branded and marked with the fullest details. So carefully prepared a clip is not often seen in this country, and it is sincerely to be hoped that the management reaped the full benefit of this enterprise. On going through the wools as they were being classed one could not but help being struck with this particular feature, and as it is one that should be copied by others it is hoped that many of the neighbouring farmers took advantage of the opportunity here afforded and visited this shed, if only to realize how a clip should be turned out.

Returning for a moment to the question of machine *versus* hand shearing, it has to be noted that several little demonstrations were given during the progress of the shearing. Among these was one which gave some visitors a vivid notion of the difference of the two methods. A sheep was shorn by hand, and well shorn. After that the machine was passed over the animal, with the result that nearly another pound of wool was taken off the pelt. In addition to this the fleece comes off the animal complete and whole when machine shorn, while the same work done by hand is invariably ragged and jagged, and replete with "second cuts", much to its detriment. With an example like this before the country more should be done to introduce machine-shearing. The small men are chary because of the



Right Section of Machine Shearers at Work at Oorlogs Poort

cost, but they should remember that a little co-operation should minimize that, while the excellent work which is done in a well-organized wool shed is in itself an incentive to better and more complete handling of the entire industry.

Nodular Disease of the Intestines of Cattle.

By Walter Jowett, F.R.C.V.S., D.V.H. (Capetown).

Nodular disease of the intestine of the sheep ("knopziekte", as it is popularly termed), is quite well known to those interested in sheep and sheep-farming in South Africa, but, as far as one can judge by perusal of the literature relating to the diseases of animals in this country, little attention appears to have been paid, so far, to an almost identical nodular disease of the intestine of cattle, which is met with quite frequently, at any rate in Capetown and the neighbouring districts in the Cape Province. There is no doubt that the "knopziekte" of sheep is widely spread throughout South Africa, being met with, in all probability, wherever sheep-farming is carried on at all extensively; whether the closely related nodular disease of the intestine of the bovine animal is equally prevalent, one is not yet in a position to state with any considerable degree of certainty; as already mentioned, it is common enough in the Cape Peninsula, and it is hoped that by calling attention to the subject one may as a result gain some idea as to the prevalence of the disease elsewhere in the Union. With this object then, and for the benefit of those interested in the subject, a short account of this peculiar diseased condition of cattle is here given, together with some notes and observations from cases met with by the author. From one very well marked case recently encountered one was fortunately enabled to prepare specimens for minute (microscopical) examination, and finally to photograph these in order to illustrate the subject matter here dealt with.

Nature of the Nodular Intestinal Disease.

The disease now under consideration is characterized by the formation of many small lumps or tubercles in the tissue immediately underlying the lining membrane of the intestine of animals affected. These nodules are usually round, firm, pea or "shot-like", and usually vary in size from that of a pin's head to that of a pea; occasionally somewhat larger tubercles or nodules are encountered, but the majority usually lie within the limits mentioned. They may be scanty in numbers, but not uncommonly hundreds of such nodules are present, in which event, of course, their presence can hardly fail to be noted. They are often apparent even before the intestines are opened, showing through the outer (serous) coat sometimes quite distinctly; they are, however, much more in evidence when the gut has been slit open, cleaned, and its lining membrane is submitted to direct observation. When this is done a number of small lumps or projections are seen in the wall of the gut, the lining membrane of the latter being usually continued in an uninterrupted layer over their surface, for all the world as if a number of small or large peas had been placed within the substance of the tissue forming the wall of the intestine. Sometimes in the older nodules—occasionally in the case of fairly recent

ones—the lining membrane of the gut is broken, ulcerated, or, more usually, considerably thickened at the site of the nodules; ulceration, however, is not a very common complication of this disease in the case of cattle.

The commonest site of the nodules is in the sub-mucous tissue of the small intestine, but they are encountered also quite frequently in the large gut, occupying here, likewise, a similar site beneath the mucous membrane, between the latter and the muscular coat, and encroaching more or less on one or other or both of these layers.

The size of the nodules has already been mentioned. With respect to colour, they vary in accordance with their age; the smaller and younger nodules are generally black (haemorrhagic), the medium-sized ones are either uniformly black or else they are white and black, whilst the larger and older nodules are either uniformly white, yellowish, or they may have greenish-yellow contents. Still older nodules are generally hard and fibrous, sometimes one finds them composed of firm fibrous walls enclosing contents which may be caseous, or in part or wholly calcareous.

CAUSE OF THE DISEASE.

Each of the recently formed or comparatively recently formed nodules encloses *one* minute larval nematode ("worm") surrounded by cells which have accumulated in response to, and as a part of, the inflammatory process excited by its presence.

In size, the young nematode in the nodule measures only from about 2 to 3 millimetres (roughly one-twelfth of an inch) in length. It is, therefore, not an easy matter to detect its presence unless one's vision is aided by the microscope.

Old nodules, as already remarked, frequently contain a yellowish or greenish-yellow material, surrounded by fibrous walls; in such nodules the demonstration of the parasite, if still present, is rather more difficult. In still older nodules with dry, firm, fibrous consistency, it is usually impossible to demonstrate the parasite, for the best of all reasons, it is no longer present therein, having migrated to the lumen of the intestine, there to become mature and to complete its life cycle.

LIFE CYCLE OF THE CAUSAL PARASITE.

The worm as met with in the sub-mucous nodule of the intestine is still in the larval condition; here it undergoes ecdysis, and in time becomes an immature adult, when the cyst (nodule) *usually* ruptures (occasionally this does not happen, in which event the parasite ultimately degenerates, and in the end may be impregnated with lime salts).

Obviously, when the nodule or cyst ruptures, the contained immature worm escapes into the lumen of the gut. Whilst it remains in the nodule, the parasite shows no sexual differentiation, but after it has been liberated from the cyst or nodule and has passed into the contents of the intestinal tube, it there undergoes further developmental changes, growing and developing finally into either a male or female adult worm. After this, the two sexes copulate in the lumen of the gut of their host.

The fertilized female worm gives origin to a number of eggs; these in the case of a closely related parasite (oesophagostome) of man

and the monkey already show segmentation whilst still in the uterus of the worm—a similar condition likewise probably holds good in the case of the parasite of cattle now under consideration. In due course the eggs pass to the exterior with the host's faeces, and there undergo certain further developmental changes, the length of time occupied in this process depending, no doubt, upon the suitability or otherwise of the surrounding temperature, conditions of humidity, etc. It is likely, however, that a supply of oxygen, as contained in the atmosphere, is essential at this stage of development.

In time, each egg gives rise to a young embryo ("worm"). The embryo ultimately gains access to the intestine of a new host (ox) with soil, food, or water. It then burrows into the lining membrane of the gut, or, according to some authors, reaches the ultimate site it occupies in the sub-mucous tissue by means of the blood stream. Be that as it may, the embryo is finally arrested in the sub-mucous coat of the intestine, where it gives rise to the formation of a haemorrhagic cyst—the nodule so characteristic of the disease.

IDENTITY OF THE PARASITE.

The nodular disease of the intestines of bovines was first described by Drechsler of Munich in 1876. Saake afterwards confirmed the findings of Drechsler. Ostertag states that he has frequently seen the sub-mucous nodules in the intestines of cattle slaughtered at the Berlin abattoir.

As to the identity of the larva, the causal agent of this diseased condition, there has been much diversity of opinion, it being, of course, impossible to determine the species of a given parasite of this nature by the mere examination of larval specimens alone, and, as already pointed out, it is only such immature worms which are present in the sub-mucous nodules. The determination of the species, then, rests on the result of examination of adult and sexually mature worms—the males especially—which are present in the *intestinal contents* of the host; these, however, are not invariably present in the lumen of the gut of the ox concurrently with the presence of the larva-containing nodules in its intestinal wall. Moreover, it is somewhat difficult at times to isolate worms so minute as are those now under consideration from the large mass of material contained in the bovine intestine. The adult parasite occurring in the intestinal contents, even when fully developed, measures only 15 to 20 millimetres in length (roughly about three-quarters to four-fifths of an inch), whilst the larval worm in the nodule is only one-twelfth of an inch long. Strose, and some of the earlier writers who studied this condition, regarded the small nematode present in the nodules as an ankylostome (*A. bovis*), Von Ratz being one of the first to consider it as representing the larval stage of a different species of parasite, namely an oesophagostome. More recently Marotel has studied the question of the identity of the parasite afresh in France, and, as a result of his researches, he has definitely shown that the nematode present in the nodules is, in reality, a larval oesophagostomum. This investigator finds that the particular species concerned in the case of cattle in France is the *Oesophagostomum radiatum*. According to Marotel, the young nematode passes through at least three successive stages:—

(1) A strongyliform larva with a small mouth;

(2) an ankylostomiform larva with an ellipsoid and monodentated mouth; and

(3) an oesophagostomiform larva with an elliptical and cuticular enlargement in the cervico-ventral region.

Says Marotel in this connection: "Each nodule encloses a young oesophagostome of variable shape and development. The length of the worm does not exceed 3 millimetres in the case of the ox (this measurement, of course, refers only to the worm found in the nodule). As long as they measure less than 4 or 5 millimetres, these larvae correspond to three types: those of 1 millimetre resemble strongyles (strongyliform larvae); those of 2 millimetres remind one of ankylostomes (ankylostomiform larvae); those of 3 millimetres are comparable to oesophagostomes (oesophagostomiform larvae). Finally, the individuals which exceed 4 or 5 millimetres are perfect, but still immature oesophagostomes; in order to reach the adult state, to copulate, and to reproduce, they are obliged to quit the nodules and to gain the lumen of the intestine."

The evolution of the oesophagostome, then, comprises two parts, the one which is effected in the interior of the intestinal nodules, and the other which is passed in a free state in the intestinal cavity; the first is of variable length, in accordance with the species involved.

Here one may state that the larva found in the intestinal nodules of the South African cattle is, as far as one can judge, identical with the parasite depicted by Marotel as present in similar nodules in the intestinal walls of cattle in France, and, as far as this investigation is concerned, the present writer regards the parasite responsible for the diseased condition here dealt with as an oesophagostome. Whether the species involved in South Africa is *O. inflatum* or *O. radiatum* one is not yet prepared to affirm, more extended study of adult specimens being necessary to decide this point. However, so far, the author inclines to the view that it may be the species last referred to (*O. radiatum*), but one hopes to study this question further as the opportunity to do so presents itself.

The accompanying illustration (Fig. 1) accurately depicts the appearance presented by the larval nematode found in one of the nodules. At A (Fig. 1) the small line will give an idea of the actual size of the parasite as encountered in this position, whilst at B (Fig. 1) such a parasite is shown magnified some forty to forty-five diameters. Figure 2 is a micro-photograph of a horizontal section of one complete nodule; part of the contained larva is here shown near the centre of the nodule, it being surrounded by many round cells, whilst a well developed fibrous wall limits the nodule externally, this, as the round cells immediately surrounding the parasite, being the result of the reactionary inflammation occurring in the tissue in consequence of the invasion of the latter by a foreign body—in this case the larval nematode above referred to.

SYMPTOMS.

With regard to the symptoms exhibited by cattle, the subjects of the nodular intestinal disease much depends upon (1) whether the infection is a heavy one or otherwise, (2) whether it is recent or of some standing, and (3) the degree of resistance which the host is able to offer against the harmful effect of the parasitic invasion. Says Marotel in this connection:—"Clinically it (i.e. the nodular intestinal

Nodular Disease of the Intestines of Cattle.

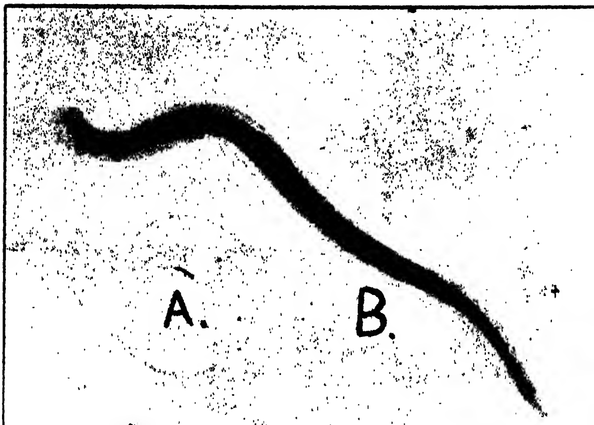


Fig. 1.

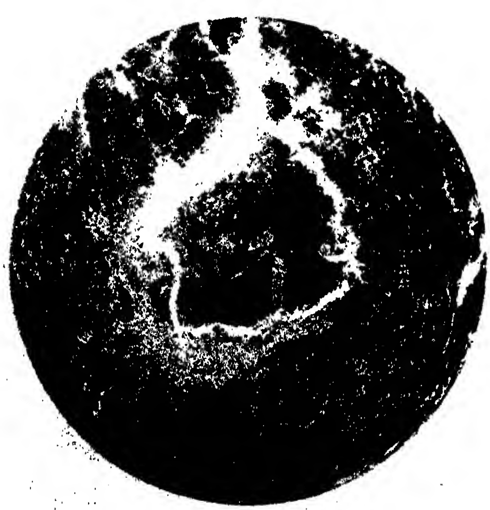


Fig. 2.

disease) reveals itself by the appearance of a chronic enteritis, watery diarrhœa, progressive wasting, anaemia, and cachexia; it terminates usually in three or four months by death in coma, and its gravity is such that in certain cases the mortality reaches the startling figure of 50 per cent." From this description it is apparent that the disease, at any rate as met with in France, is of considerable economic importance. The present writer, however, is inclined to think that the nodular disease of the intestines of bovines encountered at the Cape is somewhat less grave than the picture drawn by the French investigator above quoted. It is not unusual, when conducting post-mortem examinations on cattle slaughtered for food purposes, or on those which have succumbed to some rapidly fatal disease other than the one here dealt with, to find nodules quite numerously present along the course of the intestinal tract, and yet such animals may be in quite good condition, and they may have shown no very obvious symptoms of illness prior to death. On the other hand, there can be little doubt but that where the parasitic invasion is a heavy one, or when it occurs in an animal not in very robust condition, diarrhœa and symptoms of chronic intestinal irritation will be apparent, attended ultimately with more or less anaemia and wasting, and occasionally, perhaps, by death. Such termination, however, is probably not of very frequent occurrence, at any rate in the case of cattle at the Cape.

Obviously, a heavy invasion by the parasite referred to cannot do otherwise than impair the health of the host to a more or less appreciable extent, and to interfere with its nutrition and well-being. It seems justifiable to ascribe some of the diarrhœas of cattle, often seemingly of obscure origin, to this cause. Moreover, it is well recognized that the lesions excited by the parasite may form the starting points of other diseases; the nodules may, in fact, form the portals of entry for various micro-organisms normally occurring in the intestinal tube, and which, though harmless under ordinary conditions—that is *so long as they remain in this position* (in the *contents only* of the intestine)—become decidedly pathogenic (disease producing) once they have gained access to the general circulation, and they are of course especially liable to do so when a wound or abrasion exists in the lining membrane of the gut—herein lies one obvious danger to the host from the presence of certain species of "worms" in its intestine.

DIFFERENTIAL DIAGNOSIS.

The only disease with which it is at all possible that the above described lesions may be confounded is tuberculosis of the intestine, and this mistake is hardly likely to be made by any one who is in the least acquainted with the lesions of the malady last mentioned. However, examination of the mesenteric lymphatic glands ("kernels") will speedily settle any doubt which may exist, for whilst these are invariably involved in intestinal tuberculosis, they are intact in the case of the nodular intestinal disease (oesophagostomiasis), provided, of course, that the latter is not complicated by some other disease involving the mesenteric lymph glands.

It may not be out of place to call attention to certain lesions of the mesenteric glands, and sometimes also of the liver, which are not uncommonly met with in cattle at the Cape, namely, those due to invasion by the larval form of the Linguatula Taenoides (this larval form being known as the *Linguatula denticulata*).

The adult—the Linguatula Taenoides—is a parasite of the nasal cavities of the dog. The eggs are deposited on grass or water, and in this way they ultimately find their way to the intestinal system of some herbivorous animal—ox or sheep, etc. Once having gained the intestinal tract of one or other of these animals, the embryoes migrate to certain of the visceral structures, often, apparently, to the mesenteric glands. Here they give rise to the formation of nodules, which, in certain respects, are not unlike those caused by the tubercle bacillus, at any rate to ordinary naked-eye examination, and especially so, of course, if the examination be but a casual one or is made by an untrained observer. These "linguatula nodules" vary in size from a pin's head to a pea, or may be even much larger than this, and after a time they assume a greenish or yellowish-grey to a green colour, and are frequently of a caseous, mortar-like, or even calcareous consistency. The colour is somewhat characteristic, but in case of doubt microscopic examination will decide the question; the parasite, or if this has degenerated, then its hooks, will be found in the nodules, whilst of course in the case of tuberculous lesions the specific bacillus can be demonstrated. The writer has found the "pentastome lesions" of the mesenteric glands co-existent in some cases with the parasitic nodular disease of the intestines in cattle at the Cape—a combination of lesions which might deceive the layman, and especially so if only a casual or hasty examination had been made.

CONCLUDING REMARKS.

Preventive Measures, etc.

With regard to prevention and treatment of the nodular disease of the intestine one has but few remarks to offer. It is obvious that whilst the larvae remain encysted in the wall of the intestine—that is in the nodules—drugs administered to the host by the mouth will hardly be likely to come in contact with or to have much effect on them.

In the case of valuable animals, one can treat the symptoms of diarrhœa and irritation of the intestine as they arise by the administration of astringents and demulcents—chalk, catechu, and opium in gruel, for example. Raw eggs may be added to this mixture with benefit.

The administration of medicinal agents, such as arsenic, tartrate of antimony, or thymol, will probably rid the host of some of the round worms free in its intestinal contents. Afterwards tonics, such as iron salts (sulphate), and a liberal allowance of rock or common salt, are indicated.

With regard to prevention, naturally, if one is aware that animals become infected at a certain pasturage or with one particular water supply, one should remove them, if possible, from such source of infection.

The intestinal contents of slaughtered cattle in which lesions of the nodular disease are present in the intestinal walls should be disposed of in such manner (burning, burying, etc.) that they do not contaminate fresh pasture, since such material is liable to contain adult and fertilized female worms, as well as the ova of these.

There is no reason against the use of the meat of such carcasses for food purposes, provided that it is not emaciated, and that it is otherwise free from evidence of disease.

The Maize Industry of South Africa.

By JOSEPH BURTT-DAVY, F.L.S., Government Botanist (Transvaal).

(Paper read at the Second Dry Land Congress, Pretoria, 19th October, 1911.)

THE following paper has been prepared in accordance with the request of farmers in different parts of South Africa who wished for a general survey of the maize industry. To compress such a survey into the limit of a Journal article necessitates the cutting of it down to the narrowest limits—to bare bones, as the newspaper editor expresses it—and the omission of all detail. Every maize grower will recognize that he knows much more about the subject than is here touched upon, and every farmer who wishes to start maize growing will want much more detail than time and space allow me to give. I must be content to refer such to the various bulletins on maize growing, etc., which have been published from time to time and which can be had free of charge by writing to the Government Printer, Pretoria. These include Botanical Characters of the Maize Plant; Climatic Requirements of the Maize Plant; Maize Studies; Report of the Maize Conference, 1910; Maize Foods for the Home; The Planting and Cultivation of the Maize Crop; Maize Judging at Agricultural Shows; How to Secure Good Seed Maize; Varieties and Breeds of Maize suited to the Transvaal; Silage Crops and the Making of Silage; The Rotation of Crops for Irrigated Lands, etc.

IMPORTANCE AND HISTORY.

Maize growing will become the staple agricultural industry of South Africa, and no other crop can approach it in importance except in those parts of the country where the climate is not suitable. This is the experience of all countries in which maize thrives. The reason is apparent when we consider that no other grain crop gives such an enormous yield of both grain and fodder from an equal area of ground, and that few, if any, crops can be grown more easily and cheaply in proportion to the returns obtained. Maize will become more profitable when grown with the same care that is now given to wheat and other crops, and when full advantage is taken of the fodder produced.

I do not claim that large fortunes are to be made out of maize growing; as a rule few agricultural crops are fortune-makers to the grower unless that grower is so peculiarly situated that he has a monopoly of the world's supply or commands an exceptionally good

local market. But maize will be more profitable to the South African farmer than wheat is to the European, because the maize gives so much heavier crops and can be turned to so much better account.

The maize industry has been the making of an enormous agricultural community in the "corn belt" of the United States, and has become the foundation of numerous other industries of world-wide importance; we need only cite as examples the meat-packing businesses of Chicago, Kansas City, and other centres established in the heart of the maize belt, the starch and glucose factories, and the whisky distilleries, all of which are dependent on the maize industry.

The United States grew 108,771,000 acres (50,000,000 morgen) of maize in 1909, or more than one-third (5-14ths to be exact) of the total area of the Union of South Africa, and, roughly, 1-21st part of the total area of the United States. She produces about 820,000,000 (820 million) muids per annum, worth £333,000,000 on the farm, she exports about 11,500,000 (11½ million) muids direct, and uses about 808,500,000 (808½ million) muids in the country for human food, for feeding stock, and making starch, glucose, dextrin, corn oil, paper, whisky, etc.

The area of the Union of South Africa being about one-eighth that of the United States, and the climatic and soil conditions being equally varied in each, we may expect that South Africa will eventually have at least one-eighth as much land under maize as the United States has at present, or about 13½ million acres. At the present low average production, which is at least 3 muids per acre (6 per morgen), we shall then be producing 40,000,000 (40 million) muids of maize per annum. But I confidently look forward to the time when our average production per acre will equal that of the United States, which is 7.1 muids per acre, which would then give us an annual crop of about 96 million (95,850,000) muids.

CLIMATE AND DISTRIBUTION.

Maize is essentially a dry-land crop, which is another reason why it is of more importance than wheat to the average South African farmer. From my point of view, "dry farming" is the growing of crops without irrigation in a region where the effective rainfall is limited to a few months of the year, the rest of the year being rainless or the rains having no beneficial effect on crops owing to the infinitesimal precipitation and the rapidity and amount of the evaporation.* The minimum moisture requirement of the maize crop is not known any more than the minimum temperature which the crop can stand. How far west into the arid country we can grow maize is not yet known. But only a year or two back it was stated that the maize area of the United States could not be extended appreciably as practically all of the available ground within the then known climatic zone of the maize crop was occupied. By the breeding of

* Though many parts of South Africa enjoy a good total rainfall, the incidence of the precipitation is such that a very large part of it is lost by evaporation owing to the long, hot intervals between rains. The lateness of arrival of the rain is often such that the growing season is reduced to that of a region having a much lower rainfall, and we can therefore claim with reason that our climate is semi-arid.

short-season sorts of maize, however, the area under crop has been greatly increased, as the following figures show:—

	Area under Maize. (U.S.A.)	Increase over previous year.
1905 ...	94,011,000 acres ...	1,779,000 acres.
1906 ...	96,738,000 ,, ...	2,727,000 ,,
1907 ...	99,931,000 ,, ...	3,193,000 ,,
1908 ...	101,788,000 ,, ...	1,857,000 ,,
1909 ...	108,771,000 ,, ...	6,983,000 ,,
	Increase in 5 years =	16,539,000 ,,

We may also reasonably assume that by the application of scientific methods of plant breeding at stations established for the purpose in dry parts of the country, we can develop breeds of maize particularly suited to those conditions. At the same time the maize crop has its climatic limitations, and these should not be ignored. It is essentially a summer crop, and it would be asking altogether too much of nature to expect her to develop a winter-growing breed of maize. In those parts of South Africa where the rainfall is restricted to the winter season, maize cannot be grown as a dry-land crop, and irrigation water can usually be used to better advantage to produce other crops, such as lucerne.

As a rule maize can be grown as a staple crop to greater advantage on an inland plateau or interior river valley than on the sea coast. It is essentially a sunshine lover, and does not do well in regions subject to long spells of cloudy weather. A climate of intermittent rainfall, occurring at frequent intervals during the growing season, suits it best.

Maize is not indigenous to the African Continent, but was introduced from America centuries ago. It is to America, therefore, that we may look for new breeds with which to improve those now being grown in South Africa.

BOTANICAL CHARACTERS.

Maize belongs to the family of the grasses (*Gramineae*). It is an annual, and is sensitive to frost. The male and female flowers are borne on separate parts of the plant, which is therefore *monoecious*. Grain can only be formed if the beard or silk (the female inflorescence) is fertilized by the yellow dust (pollen) from the tassel (the male inflorescence). This is done by the wind, and not by insects. The structure and development of the flowers is such that the plants are usually cross-pollinated, that is to say are fertilized by neighbouring plants, and not by the pollen of the same plant; self-pollination is found to result in deterioration. In order to secure proper pollination, therefore, maize should be planted in blocks of rows rather than in isolated rows. The pollen is carried by the wind for a distance of 400 yards; it is therefore unsafe to plant two different breeds closer together than that distance lest they cross-pollinate. The flowers of a maize crop continue to develop for a period of at least three weeks after the first flowers appear, so that to avoid cross-pollination between two breeds grown near together, they should be planted at least a month apart; some breeds flower more quickly than others, and if they are so placed, it is best to plant the earliest-flowering breed first.

VARIETIES.

There are five main varieties of maize, the dent, flint, flour, sugar, and pop corns. Of these the pop corns are grown chiefly for use as sweets ("pop corn"), but there is a growing demand for this variety among poultry and pigeon fanciers because of the small size of the grain and its supposedly high nutritive value. The sugar corns are grown for use as "green mielies". The flour corns are very soft, and are particularly subject to weevil, so that they are of little value, except on the high veld; they also make good green mielies; flour corns are most appreciated by native races who do not use modern grinding machinery. The two staple varieties are the dent corns and flint corns; of these the latter is usually grown only in districts where the climate is not favourable to the growth of dents, for the yield of the latter is usually much greater than that of the flints.

BREEDS.

Each variety is divided into many distinct breeds which vary in colour, shape, and climatic requirements. These breeds are largely geographical in origin, and are specially adapted to peculiar conditions of climate and soil; this leads us to anticipate that, within certain limits, we shall be able to develop other breeds particularly suited to some parts of South Africa which at present are considered too dry for maize growing.

The Flint Breeds.

The Cango and Botman breeds are generally classed as fairly drought-resistant, but there is great variation in this respect between different strains of the same breed. As a rule, the flint breeds are hardier than the dents, and are more likely to succeed in arid regions. In regions of low rainfall and short season, the quicker maturing sorts, such as Will's Gehu, Will's Dakota, and Argentine are worth trial.

Dent Breeds.

Hickory King.—The earliest breed introduced into South Africa appears to have been one of the flints from which the modern "Cango" has been derived. Its hard character and relatively low yield have led to the introduction of better sorts, of which Hickory King is the best known and most widely grown. This was introduced into Natal a few years before the war, and fresh importations have been made at frequent intervals since. The reason Hickory King is such a favourite among local buyers is that the large grain appeals to them on account of its size; smaller-grained breeds may be of just as good quality and condition, but the unskilled buyer is apt to disqualify them on the supposition that they are poorly developed. Hickory King is more hardy than some other sorts grown in Natal, but cannot be considered a drought-resistant breed.

German Yellow.—In the Eastern Province and parts of the Orange Free State, German Yellow is largely grown. It is a mielie of somewhat poor quality, but is described by those who have grown it in the Free State as a good drought resister and a comparatively good yielder in the localities in which it is grown. This breed appears to be identical with the so-called "Bishop" mielie.

Chester County is a small-grained yellow dent, of quick maturing habit (four weeks earlier than Hickory King), and a good yielder. Though the grain is small, the feeding value is good, and the European buyers favour it on account of its small size. It appears to be a good drought-resister in the south-west Transvaal.

Iowa Silver-mine is a small-grained white dent, maturing about three weeks earlier than Hickory King; it is drought resistant in the western Transvaal, and is usually a good yielder. On the eastern high veld the results have not been altogether satisfactory as the plant suffers from excessive rain.

Eureka is a yellow dent which has given excellent yields at Potchefstroom, where it appears to be fairly drought resistant.

Natal White Horsetooth, *Virginia Horsetooth*, *Mercer*, *Mazoe*, *Salisbury White*, *Golden Eagle*, *Yellow Horsetooth*, and *Golden Beauty* all seem to require too long a growing season to be suitable for the drier parts of the country.

IMPROVEMENT BY ACCLIMATIZATION AND BREEDING.

While there is a good deal of difference between the several breeds of maize in their power of resistance to drought, this tendency appears to be an acquired character and to differ more between different strains of the same breed, according to the locality in which they have been bred and the length of time they have been grown in that locality. Seed obtained from the Kalahari last year proved less resistant to drought in the south-western Transvaal than local breeds, probably owing to the fact that it had been grown under irrigation. The essential point in maize growing in the drier parts of the country is to choose the hardiest breed having a growing season corresponding with the rainy season of the region and then to develop from it a local strain suited to local conditions, by rigid selection of the hardiest plants from the crop. The results are not likely to be satisfactory the first season because the strain may not be acclimatized, but do not discard the breed on that account; select the best of the seed from your crop and try again; very probably the results will be better the following year and still better in the third year. Comparatively low-growing sorts are likely to be earlier in maturing and less sensitive to drought than plants which have a larger surface to feed.

JUDGING AT AGRICULTURAL SHOWS.

The successful judge of maize at an agricultural show must have a very thorough knowledge of the breeds of maize grown in the district. As it is impossible for maize grown in a dry district to compete favourably with that grown in a wet locality, separate classes should be made at the central shows for exhibits from dry and from wet districts.

The awarding and winning of prizes are not the sole *raison d'être* of an agricultural show. Unfortunately there are people who exhibit only for the sake of winning prizes, either for their intrinsic value, which is to be condemned, or for the advertisement of their seeds or other products of the farm. Such people injure an agricultural society by discouraging others who have not the same facilities for preparing special exhibits. It is desirable, therefore, that the number of prizes which can be drawn by any one exhibitor in any section be

big to allow even a single horse-hoe to pass safely between the rows. A bigger crop and at less cost can be obtained from 100 acres well cultivated than from 200 acres poorly cultivated. One of the principal causes of the low average yields obtained in South Africa is the fact that we try to grow more maize than we can look after properly. There is an old adage that "tillage is manure"; tillage hastens the chemical changes in the soil which make the soil-ingredients available to the plant as food.

PLANT PESTS OF THE MAIZE CROP.

Weeds grow rapidly in South Africa. The soil is not rich enough to carry both weeds and mielies and to do justice to both; one will suffer, and that will every time be the mielie. Good tillage not only renders the salts of the soil available as plant food, but it destroys the weeds; but for this purpose it must be done at the right time. Keep ahead of the weed crop and you may expect good returns; once let it get ahead of you and your troubles begin. "One year's seeding makes seven year's weeding." It is better to clean the land well with the harrow before planting than to leave the weeds to be dealt with by the cultivator. One of the worst weeds of the maize crop is the red weed, witch weed, or rooi bloem (*Striga lutea*), which was discussed by Professor Pearson in the September number of the *Agricultural Journal*.

Rust does some damage to the maize crop; this is caused by a fungus which is parasitic in the leaf tissues; this trouble is a subject of investigation by the Plant Pathologist, to whom inquiries about it should be addressed.

The black smut of maize has been dealt with by Mr. Pole-Evans in a leaflet which can be obtained on application to the Division of Plant Pathology.

ANIMAL PESTS OF THE MAIZE CROP.

Chief among these are the insects known as cutworm, stalk-borer, and striped ear-worm. These are subjects of investigation by the Division of Entomology, to which inquiries about them should be addressed. I may say, however, that they cause an enormous amount of loss every year, which could be saved by the adoption of better methods of husbandry. Among the remedies suggested by Mr. C. W. Mally, who has given this matter careful study, the burning of the roots and remaining stalks of the maize crop, before the spring rains fall in September is one of the most effective and practical methods of dealing with the stalk-borer.

HARVESTING, YIELDS, AND STORING.

The usual method of harvesting maize in South Africa is to pick the ears by hand from the standing crop. This involves the employment of a large force of native labour, which is at best very inefficient, and which adds materially to the cost of production. In the corn belt of the United States this work is done entirely by white labour, usually by piece-work; one white man with wagon and team of horses will average 4900 lb. of ears per day (equivalent to 20 muid bags of shelled grain) at a cost of about 5 cents (2½d.) per bushel of 70 lb., in a crop yielding 17 or 18 muids per acre; larger averages are

obtained from heavier crops, for the lighter the crop and the further the plants are apart, the greater the distance to walk between them, and the longer it takes to fill a bag.

In this country, where the average size of the maize farm is much larger, and where native labour is daily becoming scarcer and more expensive, the application of machinery to the harvesting and handling of the crop becomes imperative. American machines have been invented and improved for the purpose of picking the ear from the stalk and husking it. These machines have been successful where the crop stands evenly in the field and where the ears are borne at a uniform height from the ground. These machines pick and husk 8 to 10 acres per day at a cost of 3 to 5 cents (1½d. to 2½d.) per bushel of maize ears, according to the thickness of the stand and weight of crop per acre; the more even the stand the cheaper the cost of harvesting. These machines are considered to be savers of time and labour rather than of actual cost. Until South African stands of maize are more uniform, it is doubtful whether these pickers will be of practical use here.

To render any machinery effective and economical, the "lands" should be as long as possible to reduce loss of time in turning.

Most of the maize grown in the States to-day is harvested by means of the "corn binder", which appears to be the most economical and useful machine used for maize harvesting. By this means three men and two teams can cut and shock 7 acres per day, as compared with 1 acre per man by hand labour. These machines cost about $125 (£25) in the States, and are considered good for 1000 acres. Allowing for repairs, the machine-cost works out at about 10d. per acre.

As the crop remains for only a few days in the best condition for shocking, the value of labour-saving machinery for rapid handling of the crop is obvious.

Another machine in use is the "corn harvester and shocker", but it is described as being too heavy and cumbersome, and the shocks which it makes are said not to be large enough to work satisfactorily; the fodder is in a less suitable form to be handled and there is much more tendency to exposure. The advantage of having the fodder in bundles is greatly in favour of the work of the corn binder, and the latter is said to cut about twice as much in a season as the former.

The machines mentioned above are used to cut the crop before it is dead ripe, which results in a saving of 50 per cent. of the feeding value of the stover as compared with the ordinary method of treatment. After cutting, the bundles of stalks are set up in large "shocks" in the field. If the crop is very green the bundles are allowed to lie on the ground after cutting so as to permit of some curing before shocking, but they should not be allowed to remain long enough for the leaves to become *brittle*. If the crop is fairly ripe it is shocked as soon as it is cut. The shocks are set up in an upright position and the tops well compressed together with a quarter-inch rope which has a ring or hook on one end. To make it stand well the shock is braced from all sides, and when the bundles are set up the butts are placed down with some force, not set up carelessly. It is best to have two men working together at shocking, as they can help each other in starting the shock, which is the most important point in shocking.

A shock should contain from thirty to forty bundles according to their size and dryness. "When a shock is well put up it should stand a whole year without any lodging. If well closed at the top, little loss will result from penetration of moisture, and the fodder when taken out of the shock will be fresh and green in colour."

Shocked maize is husked and shelled with a combined "husker, sheller, and shredder", which takes in the whole plant at one end and turns out the winnowed grain at the other. The stalks and leaves are torn ("shredded") into linear strips, which are blown or elevated into the shed or on to a high stack. When thus cut up, the fodder is more easily handled for feeding; the residue not eaten by the animals is used as bedding and is one of the best of materials for absorbing liquid manure. It is estimated that there is a further saving of 24 per cent. by feeding shredded fodder. Maize fodder should be in a well-cured, dry condition, and should not contain more than 25 per cent. of moisture or it will over-heat and spoil.

The gain in feeding value by this method of harvesting the crop is largely in protein and nitrogen-free extract (sugar, starch, etc.), which are the most valuable ingredients of the fodder.

YIELDS.

With a staple crop like maize, profits depend on getting the largest possible yield from a given area of ground. Our present average in South Africa is calculated at between 3 and 4 muids; this is much too low, for the average of the United States is between 7 and 8 muids, while good farmers in South Africa obtain 15 to 20 muids according to season and soil. In dry districts the yield will not be as heavy as in moister areas. It pays better to get a heavy crop off a small area than a light crop off a large area. When their farms are in good tilth, there appears to be no reason why good farmers should not produce an average of 15 muids per acre on the eastern high veld, though we cannot expect to get as much in the drier western districts.

STORING, HANDLING, AND MARKETING.

Great loss of stored maize is caused in the warmer parts of the country by the grain weevil and grain moth. These insects require a certain combination of moisture and temperature to propagate to a dangerous extent. This combination is usually met with at and below about 4000 ft. altitude: on the high veld, at and over 5000 ft., maize has been kept safely through the summer without injury by these pests. On this account the erection of store-houses or elevators on the high veld has been recommended. Grain stored in bulk is not affected as badly as that in bags, for the weevil and moth can only live and propagate where they have access to fresh air, and it is found that with bulk-stored grain only the top layer, a few inches thick, is attacked by the insects.

There is considerable misapprehension as to how the weevil and grain moth propagate their kind, and this has hindered the proper treatment of the trouble. Many people think that in some mysterious way these insects develop out of the grain by spontaneous generation; one often hears it said that "weevils come out of the grain, but don't go into it"; this is less than half a truth. The actual fact is that

these insects cannot come out of the grain unless they have first gone into it, and that they entered the grain, in the first place, in the form of minute larvae ("worms") which have hatched out of the tiny eggs laid on the grain by the adult insect. These larvae feed on the inside of the grain, gradually making the holes larger and larger to fit their growing bodies; when fully fed they change into pupae and remain in that state until conditions are favourable for them to emerge as full-grown insects.

Storage in air-tight pits or tanks, and treatment of the stored grain with carbon-bisulphide, are recommended by the Division of Entomology as the best means of prevention in districts subject to weevil. Mielies should not be stored in bulk till thoroughly dry, or sweating and fermentation, with subsequent damage to the grain, are sure to follow. Maize containing over 12 per cent. moisture is liable to heat on the voyage to Europe and to be damaged on arrival. One advantage of Hickory King maize is that it dries more rapidly owing to the thinness of its cob, but, on the other hand, the very thin cobs cannot carry as much grain as thicker ones.

In the United States most of the crop is handled in bulk from the farm to the elevator, factory or ship, and is carried to Europe in bulk in the hold of the steamer.

Silage.

In a country like South Africa, subject to a long, dry winter, the use of succulent winter feed for stock is a great help in keeping the animals in condition and maintaining growth or milk flow. Under such conditions, and where hay is difficult to make, as it often is with us, good silage becomes an invaluable asset to the stock farmer. One of the best crops for turning into silage is the mielie because it makes a good quality of silage and gives a heavy yield per acre. Maize for silage should be planted more thickly than when grown for grain. 12 to 15 tons of silage per acre may be obtained from a good crop of maize. 35 to 40 lb. per day is used for feeding cows, or 20 lb. for oxen when they have roughage in addition. A ton of silage, plus roughage, will thus keep an ox for 100 days or a cow for 50 days. A silo, 10 ft. x 20 ft., holds 28 tons of silage, and will take 3 acres of maize to fill it if the crop gives 15 tons per acre; this will keep 8 cows for 6 months at the rate of 40 lb. per diem.

It is usual to make pit silos in South Africa, the dry winters lending themselves to this simple method of treatment. Some farmers save labour at harvest time by putting the stalks whole into the silo, but this involves much more labour in taking out the silage for feeding, and most farmers prefer to cut it into short lengths of 1 to 2 inches with a chaff cutter or silage cutter. Some farmers build stack silos, weighting them with trees, stones, or veld hay.

Maize Fodder and Grain for Stock Feed.

Maize fodder is one of the cheapest and most valuable forms of stock food. In the western part of the American corn belt some farmers do not husk their mielies but turn the stock (cattle, sheep, and pigs) into the fields and allow them to gather their own feed; for the first two weeks they are only allowed in the field a few hours daily, but later they are given free access to the crop. The pigs are not turned

in till three or four weeks later as they make the fodder somewhat distasteful to the cattle. The advantages of this method of treatment are: (1) the labour of harvesting, husking, and shelling is saved; (2) the husks serve as roughage for the animals; (3) the manure of the animals is left on the land in an available form instead of being leached out in the kraal or yard.

Stover.

"Stover" is the fodder after the ears have been removed. In South Africa it is customary to turn the stock into the fields after husking to pick up the ears which have been missed or dropped and to eat down the stalks. This method has not the advantage of that just described in saving the labour of harvesting, and results in a good deal of waste of fodder as compared with harvesting with a binder. In the Western United States this method is practised to some extent, and there the pasturage on old maize lands is sold to stock-raisers for 50 cents to $1.50 (2s. 1d. to 6s. 3d.) per acre.

Maize Fodder.

Maize fodder, grown so thickly as to allow only the formation of nubbins, is one of the cheapest and best forms of roughage obtainable. In the States it is specially valued for horses, mules, and colts. In the States green maize fodder is fed in liberal quantities to work horses during the late summer months. Owing to the quantity produced per acre and its nutritive value, it is one of the most economical feeds that can be grown. There is very little difference in the digestibility of cured maize fodder and maize silage, but the green fodder is more digestible than either.

Grain.

The most profitable method of disposing of maize grain is to send it to market on four legs, or, in other words, to turn it into a second product before selling, such as beef, pork, milk, butter, cheese, wool, eggs, etc. At 8s. 4d. per muid, mielies only bring ½d. per lb.; roughly speaking it takes a bag of mielies to fatten a pig of selling weight; this sells in South Africa at 4½d. per lb.; allowing 4d. net, the bag of mielies makes 50s. in the form of live pork; these figures are, of course, only approximate.

Maize grain contains about 70 per cent. starch, 5 per cent. oil, and 10¼ per cent. protein. The mineral matter is comparatively low. The proportion of digestible matter is high, viz., of the protein 76 per cent., carbohydrates 94.7 per cent., ether extract 84.8 per cent. Its high digestibility makes maize an economical foodstuff. "Its constituents are in such physical and chemical combination as to be easily disintegrated, dissolved, acted upon by the digestive juices and assimilated." It is also easily masticated, except when very dry and flinty from long storage. The starch readily changes to sugar in the process of mastication, which renders it very palatable. In the States it is found that for practical purposes it is more economical to feed maize on the ear than to cart it to the mill and grind it for feed.

For fattening mutton, maize is largely used in the Western States in the proportion of 1 : 5, i.e. 1 part protein to 5 of carbohydrates. It is not found satisfactory for breeding ewes.

For fattening beef and pork, maize is one of the best of feeds, but it is not conducive to high milk production. In the States maize is found to be a very desirable feed for horses, in the ratio of 1 : 6.2, because it requires so little time for mastication. But draft horses should not be given too much maize during the working season. Maize grain has the ratio 1 : 9.7, which is too broad, and some protein food should be added to reduce it; oats and bran are often used for this purpose.

MAIZE FOR HUMAN FOOD.

The value of maize for human food is not yet fully appreciated. Owing to the absence of gluten, maize meal is not used to make ordinary bread unless mixed with wheat flour. Owing to its comparative cheapness, its use to "adulterate" wheat flour is greatly on the increase. Flour so "adulterated" yields fewer loaves than an equal quantity of pure wheat flour, and the bread produced is more moist than wheat bread and has a tendency to be sodden. An addition of 10 per cent. of maize flour is calculated to mean a reduction of five loaves to a sack. One-third of its weight of good wheat flour is sufficient to enable fine maize meal to make good loaves.

But there are many forms in which maize flour and meal may be used alone, and a Bulletin has been issued by the Department of Agriculture, which has reached its 5th edition, and which contains over a hundred cookery recipes for the use of mielies for human food.

Among the various maize foods on the market may be mentioned Corn Flour, Maizena, Oswego, Corn Crisp, Corn Flakes, Silver Flakes, Hominy, Cerealine, and Samp.

OTHER USES OF THE MAIZE CROP.

Few persons realize the wonderful asset which the country possesses in its maize crop. Apart from its main value, which is that of feeding man and his domestic animals, maize has an enormous value as one of the raw materials of manufacture. Maize is one of the principal sources of the manufacture of *starch*. From the crude or "green" starch are prepared *dextrin* and granulated gum, used for gumming postage stamps, paper boxes, and fine fabrics, and for making paste and mucilage.

Glucose or "grape-sugar" is made from starch, and is used to mix with beet or cane syrup to make "Karo", "Korn King", and other syrups. Jelly glucose is the basis of manufactured jellies. Fancy fruit preserves are put up in glucose.

Whisky and commercial alcohol are now largely distilled from maize. One bushel (56 lb.) of maize will produce 2.7 gallons of 95 per cent. alcohol.

The inner husks make fine ladies' hats and are used to pack mattresses and horse collars; the coarser husks are used to make floor mats. From the husks, also, a very fine quality of bank-note paper is made. The leaves and stalks are also used for paper-making.

Maize cobs make good fuel and fire lighters, and are also turned into "Missouri Meerschaum" and "Corn-cob" pipes.

"Corn-down", or chaff, obtained in the manufacture of cob pipes, and in cleaning out shelled grain, is used in upholstering and in padding mattresses.

The coarse pith of the maize stalk is manufactured into stiff box-board. The pith is also being used as a packing for war vessels and in the manufacture of cellulose and gun-cotton. Pyroxylin varnish is a liquid by-product obtained in the manufacture of cellulose.

Finally, the leaves, outer shell of the stalk, and the other refuse remaining from the manufacture of cellulose, are finely ground, mixed with dried blood, etc., and sold as stock feed.

The "Availability" of Phosphoric Acid in the Soil.

By H. J. Vipond, B.A., Assistant Chemist, Pretoria.

The important question of the availability of the phosphoric acid in the soil has now been a matter of study for about thirty years. Before that time soil analysis so far as the mineral ingredients were concerned consisted in determining the amounts of plant food extracted by digestion with *strong* acids. Dyer's classic work on the soils of the Rothamsted Experiment Station, whose manurial history even at that date (1894) went back for fifty years, showed not simply that the above method was of no use in determining the immediate requirements of soils, but that in dilute citric acid we had a solvent which gave results in accordance with what was known from experience and accurate knowledge of the past history of the soil. The use of this solvent had been suggested earlier, but it was Dyer who from investigations into the natural acidity of the root sap of a very large number of plants of different species established a claim for the choice of a 1 per cent. solution of citric acid as the most suitable solvent for determining the immediately available plant food.

Whether the rôle played by the acids of the root sap be of greater or less importance, the use of this solvent has continued, although others have also been tried and claimed to give equally good results.

Apart, however, from the original work of Dyer on the Rothamsted soils there has not been a great deal of material *published* on this subject, and in America particularly, where such a great deal of soil analysis has been done, the determination of "available" plant food by the use of weak solvents has latterly not been thought of much importance. The dictum of Hilgard has been followed, viz., that, with regard to virgin soils, if the soil yields a large amount of potash or phosphoric acid to strong acids then it will also have a large amount of these materials in an available condition. Dyer's work at Rothamsted, having been carried out on soils which had been cultivated for hundreds of years and in which the immediate fertility was largely due to manure supplied, was not considered to be applicable to the virgin soils of the United States. On the other hand, Hilgard, in his book "The Soil", gives one or two classic instances in contradiction of his general statement. The instances referred to are the soils of the Hawaiian Islands, which contain a large amount of iron oxide and alumina (up to 40 or 50 per cent.), and in spite of a large percentage of phosphoric acid (i.e. up to 0.9 per cent.) contain only a small amount soluble in 2 per cent. citric acid. This is more particularly the case with the soils of the Island of Oahu. Those of Hawaii itself show

considerably higher amounts of " available " phosphoric acid, which Hilgard attributes to their containing relatively more alumina and less iron oxide. It would appear to the writer, however, from a comparison with the soils of the Transvaal that it is more probably due to the fact that the latter soils contain a much higher ratio of lime and magnesia to iron oxide and alumina than those of Oahu. So clearly does this appear in our investigations of the Transvaal soils that we can safely predict that any soil which contains a high ratio of lime and magnesia to iron oxide and alumina will also show a high ratio of " available " to total phosphoric acid. The converse, however, is by no means equally true.

When it is remembered that our soils are on the average woefully deficient in available phosphoric acid the importance of this point will be obvious.

For the purpose of arriving at a classification of the Transvaal soils on this important question it was necessary to take a numerical basis, and for this purpose the writer has chosen to compare the ratio of " total " to " available " phosphoric acid with the ratio of the iron oxide and alumina to the lime and one-half of the magnesia. The iron oxide and alumina have been separately determined in only a small number of the soils whilst the inclusion of half of the magnesia with the lime enables us to assign a preponderating influence to the latter, although we have no actual knowledge of their relative values in this direction.

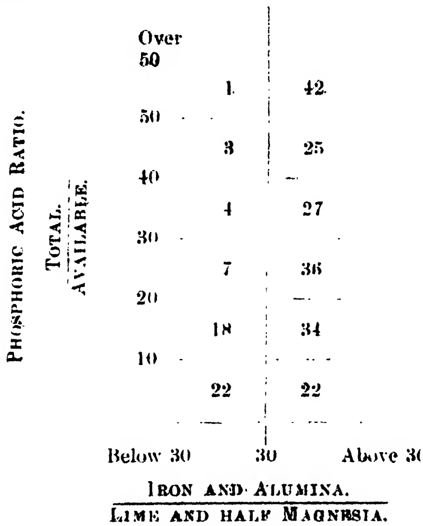
On this basis, dealing with about two hundred and fifty soils analysed during the last two years, these have been marked on a diagram of the following type. Without giving the exact position of each point the number of soils falling in each square is given :- -

RATIO OF "TOTAL" TO "AVAILABLE" PHOSPHORIC ACID.	0–10	10–20	20–30	30–40	40–50	Over 50
Over 50	0	1	0	1	2	39
40–50	0	1	2	5	1	19
30–40	0	1	3	3	4	20
20–30	1	4	2	9	2	25
10–20	0	7	11	9	1	24
0–10	9	8	5	3	2	17

RATIO OF IRON OXIDE AND ALUMINA TO LIME AND HALF MAGNESIA.

When the ratio of iron oxide and alumina to lime and half magnesia exceeds, say, forty, there does not appear to be very much further loss of availability even up to a ratio of eight or nine hundred, therefore beyond ratios of fifty the soils are all grouped together. The real significance of this diagram is most clearly brought out by

taking the iron-lime ratio as the basis, with the dividing line for instance at thirty. This is done below:—



It should be remembered that 22.8 per cent. of the soils show an "iron-lime" ratio less than 30, and 77.2 per cent. show ratios above 30. The following table gives the percentage of the total number of soils in each class falling in each of the different divisions of the phosphoric acid ratio scale.

Phosphoric Acid ratio ...	0 to 10	10 to 20	20 to 30	30 to 40	40 to 50	Over 50	TOTAL.
	%	%	%	%	%	%	%
Iron-lime ratio below 30	40	32·7	12·7	7·3	5·5	1·8	100
Iron-lime ratio above 30	11·8	18·3	19·4	14·5	13·4	22·6	100

This shows clearly that a fair amount of lime in the soil ensures a fair availability of the phosphoric acid. On the other hand many soils with a poor ratio of lime to iron oxide show a high ratio of availability of the phosphoric acid. Soils rich in humus almost invariably contain a good deal of available phosphoric acid whether rich in lime or not—there is no doubt, therefore, that the phosphates of the humus are dissolved to a considerable extent by 1 per cent. citric acid. Sandy soils, which usually contain low percentages of iron oxide alumina, lime, and phosphoric acid, with nevertheless a high ratio of iron to lime, show as a rule a better ratio of availability of phosphoric acid. This does not mean that the actual amount of available phosphoric acid is greater in the sandy soils.

As regards the occurrence of lime in the Transvaal soils, the bulk of them are very poor in lime as we have already seen. Those containing a fair amount of it may be classified as follows:—

It might be mentioned the figures given above are exclusive of eight soils, which contained exceptional percentages of lime, ranging

from 1.78 to 29.72 per cent., since the extraction by dilute citric acid becomes useless in the presence of so much lime, owing to its neutralizing the whole or part of the acid—unless allowance is made for this by adding a corresponding excess of citric acid, which has not been the practice here.

Soils containing a fair amount of lime include:—

(*a*) Those derived from rocks rich in lime, i.e.—

(i) dolomite;

(ii) norite;

(iii) amygdaloidal diabase (bushveld amygdaloid);

(iv) calcareous drift of recent origin, such as occurs in the neighbourhood of Pienaars River, Pretoria District.

(*b*) Certain alluvial soils.

(*a*) (i) *Dolomite*.—The bulk of the soils lying directly on the dolomite (sedentary soils) are poor in lime—consisting of the silicеous or cherty portions of the rock. Where, however, there is an accumulation of alluvial soil in the lower lying parts along the water-courses, etc., this is apt to be rich in lime, and the same is true of most low-lying alluvial deposits laid down in the drainage water from this formation. These will be dealt with under the heading of "Alluvial Soils Rich in Lime".

(ii) *Norite*.—This rock covers a considerable area in the Transvaal and is characterized by a large amount of heavy black soil ("turf") containing from .5 to 3 per cent. lime, which in many cases is visible to the eye in the form of soft rounded white grains. This type of soil covers the lower-lying parts (laagtes, etc.), whilst the higher ground usually carries brown heavy loam or clay loam not so rich in lime. Both types, however, are rich in iron oxide and alumina.

In some places in this area white to grey calcareous deposits occur containing 50 per cent. or more of carbonate of lime, whilst the weathered rock often shows bands of the same material.

The more important areas covered by this rock are:—

(1) The country traversed by the Pretoria-Rustenburg Railway, from Onderstepoort westwards.

(2) The Hex River basin, in which the town of Rustenburg is situated.

(3) A large part of Secocoeniland. Other occurrences are also marked on the Geological Survey Maps.

(iii) *Bushveld Amygdaloidal Diabase*.—This rock covers nearly the whole of the Springbok Flats. Here again the soil of the lower-lying parts consists largely of "black turf", and that of the higher portions of reddish-brown heavy loams, lighter in texture and poorer in lime. Surface deposits rich in lime (sometimes pure calcite) occur here also. On both these formations surface water is scarce, and there are practically no permanent streams except in the case of the Rustenburg basin, which is surrounded by quartzite hills.

(iv) *Calcareous Drift*.—In the district around Pienaars River there are recent surface deposits of limestone of an alluvial nature, probably derived from the denudation of the bushveld amygdaloid. The deposits are worked for lime and give rise in some instances to soils rich in lime.

Many of the soils derived from the rocks discussed above are very poor in lime—generally speaking the soil of the bults is poor in lime and of a brown or reddish colour, whilst that of the laagtes and

pans is grey or black, whilst intermediate soils are often of a reddish-black or chocolate colour. A good many analyses of soils from these formations are given in a table on pages

(*b*) *Alluvial Soils Rich in Lime.*—Soils of this type are of scattered occurrence and vary in texture from light sandy soils through greyish soils to heavy black turf. Instances of light vlei soils rich in lime are found even on the granite formation which is notably deficient in lime.

As instances of this type of soil may be given, Nos. 435 A, B, and C, from Leeuwkop, Yukskei River, Pretoria District. They are all derived from the granite and are dark, sandy vlei soils, Nos. 435 B and C, containing visible white grains of carbonate of lime. This gives a very good illustration of how lime tends to concentrate in badly drained situations, whilst it appears to be so readily washed out of the soil in higher-lying areas. What is the cause of this reversal of the usual process is a matter for speculation, but such soils are invariably dark in colour although not always very rich in nitrogen. This points to a peculiar type of humification since it is not at all uncommon for the heavier "black turf" soils to contain as little as .1 per cent. of nitrogen, whereas the better drained brown clay loams usually contain rather more than that amount. Soils and alluvial deposits *exceptionally* rich in lime occur in quite a number of places. They vary from grey powdery material ("ash" soils) to white marly clay. The chief localities from which such samples have been obtained are—

(i) the norite area mentioned above;
(ii) the Springbok Flats;
(iii) the district round Pienaars River;
(iv) areas either situated on the dolomite or bordering on and receiving drainage water from that formation. One of the most notable districts is the neighbourhood of Zeerust. The courses of the streams where they leave the dolomite and also where streams occur actually on that formation are often marked by large vleis and stretches of alluvium, which in some cases contains as much as 90 per cent. of carbonate of lime and are spoken of as "ash" soils. A similar state of affairs is to be found along the Upper Mooi River and in other parts of the Potchefstroom District. Numerous occurrences of black turf soils containing about 1 per cent. of lime are to be found in other parts of the country along the watercourses. One example is No. 1297, from Zwartspruit (Uitzicht No. 586), west of Pretoria. Nos. 363 and 364 are examples of alluvial soils from the farm Wonderboom on the Aapies River, about seven miles below Pretoria. They contain considerably more than the normal amount of lime, probably owing to the fact that the water of this stream is largely derived from the dolomite.

There is one other most important stretch of calcareous soil to be considered, but in this case we are hampered by the fact that the ground has not been geologically surveyed. It stretches roughly from the neighbourhood of Bethal in an E.S.E. direction for about forty miles to the farm Drinkwater No. 73—eleven miles south of Ermelo. The parent formation is a bluish-grey igneous rock apparently overlying the coal measures of the Karoo system. The soil

varies from heavy loam to clay loam, and is mostly black in colour. There is also a considerable area of red and brown heavy loam soil of very good depth derived from the same or a similar igneous rock, bordering on the above-mentioned black soil. The red and brown soils, however, are poor in lime, whereas the black soil appears to be invariably fairly rich in that substance.

Nos. 1496 and 1497, 246, 1606, 1607, 1773, and 1774 are all black soils from this area.

Nos. 1608, 1829, and 1830 are heavy brown to red soils from Ermelo District, derived from the igneous rocks mentioned above. No. 1608 from the farm Drinkwater No. 73 is surrounded by black soil and even the brown soils in this neighbourhood are said to be very good.

In conclusion, it should be pointed out that we have no regular beds of limestone in the Transvaal with the possible exception of the recent surface deposits near Pienaars River, so that calcareous soils are comparatively scarce and lime is usually very expensive. The use of this substance in some form or other is nevertheless advisable over the greater part of the Province, and as the ordinary lime is so costly there is all the more reason for advocating basic slag, which provides phosphates at a cheaper rate per unit than superphosphate, and in addition the equivalent of perhaps 20 per cent. of lime in a basic or active form.

No. of soil:—	437.	438.	463.	695.	819.	820.	821.	822.	932.	976.	1167.	1262.	2046.	109.	110.	111.	112.
	SOILS DERIVED FROM NORITE: AREA TO NORTH OF MAGALIESBERG BETWEEN PRETORIA AND RUSTENBURG.													SOILS DERIVED FROM CALCAREOUS DRIFT: AREA ROUND PIENAARS RIVER.			
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Stones	Nil	Nil	Nil	Nil	·32	·30	Nil	·28	Nil	Nil	Nil	—	Nil	Nil	Nil	Nil	·03
Composition of air-dry fine earth:																	
Moisture	7·10	5·61	2·66	6·01	2·73	6·38	6·49	7·99	8·52	3·77	4·62	6·95	7·49	9·18	8·38	2·34	1·23
Loss on ignition (chiefly organic matter)	8·17	9·55	4·51	8·83	3·89	11·10	6·13	10·43	6·80	7·42	4·24	5·60	4·85	9·54	8·16	5·29	3·22
Insoluble in strong acid	60·33	52·37	83·88	67·61	84·44	63·10	72·82	55·10	59·45	72·65	80·05	73·85	75·10	64·81	67·15	78·88	88·38
Iron oxide and alumina	21·04	31·47	7·68	16·23	7·82	16·80	12·57	23·61	20·84	15·01	10·19	12·77	11·48	13·56	13·95	12·71	6·64
Lime	2·03	·15	·39	·83	·70	1·46	·92	1·56	3·80	·55	·57	·41	·50	1·11	·74	·10	·09
Magnesia	1·12	·05	·24	·15	·36	1·18	·89	·78	·40	·39	·19	·23	·38	·23	1·61	·05	·08
Potash	·16	·12	·17	·06	·18	·19	·15	·20	·05	·10	·15	·08	·02	·95	1·18	·35	·21
Phosphoric acid	·06	·08	·05	·03	·05	·05	·03	·06	·16	·05	·04	·06	·05	·10	·10	·04	·05
TOTALS	100·01	99·41	99·58	99·75	100·17	100·26	100·00	99·73	100·02	99·98	99·95	99·95	99·87	99·48	101·27	99·76	99·89
Nitrogen	·088	·171	·092	·094	·110	·141	·165	·174	·098	·117	·040	·067	·081	·146	·108	·082	·055
Available potash	·0058	·0054	·0031	·0018	·0283	·0251	·0171	·0163	·0013	·0057	·0163	·0010	·0008	·0287	·0274	·0220	·0146
Available phosphoric acid	·0094	·0068	·0138	·0043	·0182	·0041	·0102	·0048	·0187	·0051	·0044	·0031	·0023	·0087	·0135	·0082	·0018
	Black turf (heavy).	Dark-brown clay loam.	Black turf (fairly heavy).	Heavy black turf.	Brown medium loam.	Dark-brown clay loam.	Dark-coloured medium loam.	Heavy brown loam.	Heavy black turf.	Heavy brown loam.	Heavy brown loam.	Black turf (fairly heavy).	Fairly heavy black turf.	Black turf (medium texture).	Dark-coloured heavy loam.		Medium red loam.

SOILS FROM SPRINGBOK FLATS: DERIVED FROM BUSHVELD AMYGDALOIDAL DIABASE.

No. of soil:—	273i.	273ii.	27iii.	273iv.	722.	723.	724.	725.	1734.	1735.	1736.	1737.	1738.	1739.	1740.	1741.	1724.	1743.	1744.
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Stones	·72	·50	Nil	Nil	Nil	Nil	·12	2·17	Nil	Nil	1·0	1·0	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Composition of air-dry fine earth: Moisture	3·19	3·38	6·52	5·83	5·21	8·85	3·29	3·99	5·00	4·73	4·82	5·96	9·11	9·45	6·63	5·10	6·56	5·59	5·26
Loss on ignition (chiefly organic matter)	9·56	10·39	10·18	11·58	8·20	10·88	8·61	7·51	7·49	6·92	6·86	6·01	7·17	7·37	7·86	7·31	7·43	7·16	7·91
Insoluble in strong acids	67·18	65·18	65·76	61·34	68·46	60·20	70·77	72·52	67·69	70·50	69·38	70·89	63·02	62·49	64·78	66·14	65·52	66·38	66·75
Iron oxide and alumina	18·90	19·46	14·56	19·35	17·44	14·19	15·65	13·60	13·27	15·90	15·40	15·05	19·25	19·55	19·40	19·95	18·10	18·50	19·40
Lime	·62	·55	2·17	·55	·22	4·43	·62	1·15	5·60	1·48	3·97	1·49	1·02	·75	·22	·14	·41	·81	·42
Magnesia	·47	·53	·03	·17	·26	1·03	·42	·58	·14	·18	·10	·17	·10	·12	·15	·05	·21	·63	·25
Potash	·41	·54	·04	·31	·45	·57	·72	·63	·10	·14	·26	·30	·45	·46	·28	·19	·29	·46	·41
Phosphoric acid	·09	·05	·03	·02	·06	·06	·05	·20	·08	·08	·08	·07	·07	·08	·09	·05	·06	·05	·06
TOTALS	100·42	100·08	99·29	99·15	100·30	100·21	100·13	100·18	99·46	99·94	100·94	100·02	100·27	100·35	99·51	98·98	98·65	100·57	100·52
Nitrogen	·123	·127	·091	·077	·132	·127	·123	·164	·095	·112	·108	·126	·133	·137	·118	·115	·125	·110	·116
Available potash	·0202	·0248	·0076	·0209	·0345	·0081	·0339	·0644	·0053	·0080	·0036	·0083	·0140	·0120	·0163	·0185	·0206	·0163	·0177
Available phosphoric acid	·0028	·0064	·0104	·0145	·0018	·0095	·0036	·0988	—	·0105	·0052	·0143	·0059	·0047	·0014	·0011	·0014	·0022	·0010
	Red medium loam.	Dark-brown heavy loam, chocolate coloured.	Black turf (fairly heavy).	Heavy black turf.	Red light loam.	Fairly heavy black turf.		Dark-brown heavy loam (barren patch).	Fine-grained grey loam ("ash" soil).	Dark-grey loam.	Dark-greyish loam.	Dark-grey loam.	Black heavy loam.	Black heavy loam.	Reddish heavy loam.	Reddish heavy loam.	Chocolate-coloured heavy loam.	Dark-grey clay loam.	Chocolate-coloured heavy loam.

	CALCAREOUS SOILS OF HIGH VELD.										ALLUVIAL SOILS FROM VARIOUS PARTS.							
	Bethal and Ermelo Districts.										Leeuwkop, Yokeskei River (derived from Granite).			Uitzicht Black Turf.		Wonderboom, Aapies River Alluvial.		
No. of soil:—	246.	1496.	1497.	1606.	1607.	1608.	1773.	1774.	*1829.	*1830.	435a.	435b.	435c.	229b.	1297.	363.	364.	556.
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Stones	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	·55	Nil	Nil	Nil	2·36
Composition of air-dry fine earth: Moisture	8·81	6·76	6·26	6·84	11·01	5·61	7·93	7·67	3·96	3·47	2·05	2·48	2·74	6·30	6·57	1·95	4·11	6·88
Loss on ignition (chiefly organic matter)	11·67	9·07	7·05	10·06	15·05	8·22	12·52	12·40	6·16	6·9[illegible]	6·30	4·67	5·62	10·01	11·29	3·55	4·87	8·69
Insoluble in strong acid	54·98	68·95	70·85	65·12	54·90	70·76	58·77	59·88	69·48	69·7[illegible]	85·37	81·91	81·40	63·92	56·90	86·30	74·85	68·09
Iron oxide and alumina	20·70	14·46	14·50	17·40	17·40	14·01	17·45	15·60	20·65	19·8[illegible]	5·32	6·97	4·79	18·52	22·26	7·12	13·71	14·36
Lime	2·30	·35	·36	·86	·47	·04	2·26	2·29	·04	·0[illegible]	·37	2·20	4·62	1·01	1·40	·48	·86	1·04
Magnesia	·70	·22	·36	·13	·15	·08	·63	·93	Trace	Trace	·36	·54	1·34	·26	1·42	·41	·64	·01
Potash	·20	·22	·19	·38	·11	·28	·16	·10	·14	·1[illegible]	·21	·17	·11	·35	·31	·10	·27	·29
Phosphoric acid	·05	·04	·03	·09	·08	·15	·11	·12	·13	·1[illegible]	·04	·05	·07	·04	·09	·10	·09	·04
TOTALS	99·40	100·07	99·60	100·88	99·17	99·15	99·83	98·99	100·56	100·27	100·02	99·94	100·69	100·42	100·24	100·01	99·40	100·00
Nitrogen	·136	·186	·113	·237	·302	·133	·227	·274	·092	·137	·155	·069	·043	·115	·215	·070	·140	·099
Available potash	·0036	·0053	·0019	·0135	·0115	·0138	·0056	·0050	·0016	·0022	·0021	·0077	·0025	·0108	·0116	·0076	·017[illegible]	·0019
Available phosphoric acid	·0025	·0023	·0011	·0079	·0115	·0101	·0025	·0029	·0024	·0026	·0074	·0102	·0061	·0064	·0046	·0209	·019[illegible]	·0097
	Heavy black turf.	Black turf (medium texture).	Black turf (medium texture).	Black turf (medium texture).	Black turf (rather heavy).	Brown, rather heavy loam.	Black turf.	Black turf.	Red medium loam.	Red clay loam.	Dark, sandy soil.	Dark, sandy soil.	Dark, sandy soil.	Black turf (heavy clay soil).	Black turf (heavy clay soil).	Dark-coloured light loam.	Dark-coloured medium loam.	

1829 and 1830 are two red soils derived from igneous rocks of Karroo System, but poor in lime.

ALLUVIAL SOILS, RICH IN LIME, FROM NEIGHBOURHOOD OF DOLOMITE.

	District round Zeerust.				From Valley of Mooi River, Potchefstroom District.									Two Soils from Nylstroom Dist.		Four Soils from Doornbult No. 93, Wolmaransstad District.			
No. of soil:—	866.	905–12	1733.	1846.	267*a*.	267*b*.	267*c*.	267*d*.	536.	538.	541.	1281.	1282.	1854.	1924.	2027.	2028.	2029.	2030.
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Stones	3·96	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Composition of air-dry fine earth: Moisture	3·24	1·50	3·32	3·76	5·26	3·10	3·87	3·44	8·71	7·42	6·65	3·70	9·22	·81	2·36	1·61	1·65	1·02	3·96
Loss on ignition (chiefly organic matter)	7·31	*43·76	*31·55	*40·64	9·61	8·40	9·67	*14·48	8·68	7·50	6·95	*27·18	*14·06	3·47	4·91	2·55	1·56	3·54	5·26
Insoluble in strong acid	71·85	3·87	24·42	9·03	72·88	79·96	72·83	67·36	65·16	70·40	73·08	34·85	53·10	92·15	76·89	89·74	91·60	87·85	77·80
Iron oxide and alumina	14·77	·57	9·67	4·58	9·56	5·77	10·26	7·57	15·34	13·45	11·68	8·61	16·18	2·17	14·50	4·56	4·58	6·93	10·99
Lime	1·06	49·08	29·72	39·66	1·43	2·31	2·46	6·68	·76	·45	·50	24·65	6·77	·27	·17	·34	·12	·09	·76
Magnesia	1·04	1·15	·35	2·41	·73	·14	·78	·09	·60	·17	·03	·99	·24	·09	·16	·23	·14	·12	·47
Potash	·61	Trace	·03	Trace	·20	·26	·25	·18	·61	·58	·46	·21	·34	·12	·34	·06	·10	·18	·31
Phosphoric acid	·18	·03	·07	·07	·08	·06	·06	·07	·05	·04	·05	·04	·07	·06	·05	·04	·02	·02	·06
TOTALS	100·06	99·96	99·21	100·15	99·75	100·00	100·18	99·87	99·91	100·01	99·87	100·23	99·98	99·14	99·07	99·13	99·77	99·75	99·61
Nitrogen	·119	—	·286	·256	·230	·194	·146	·215	·166	·119	·144	·150	·168	·168	·088	·060	·043	·057	·092
Available potash	·0102	—	—	—	·0040	·0089	·0016	·0019	·0058	·0080	·0126	—	—	·0101	·0121	·0027	·0074	·0127	·0080
Available phosphoric acid	·0243	—	—	—	·0173	·0362	·0160	·0130	·0143	·0158	·0099	—	—	·0154	·0014	·0081	·0011	·0011	·0198
	Rather heavy brown loam, with pieces of limestone.		Light-grey chalky clay loam.	Light-grey chalky clay loam.	Greyish-black light loam.	Greyish-black light loam.	Dark-grey light loam.	Dark-grey light loam.	Greyish-black heavy loam (alluvial).	Dark-grey heavy loam (alluvial).	Dark-grey heavy loam (alluvial).	Grey chalky soil.	Black turf.	Greyish sandy soil.	Grey sandy loam (alluvial).	Dark-grey medium (alluvial) loam.	Brown sandy loam, fine-grained.	Brown light loam, fine-grained.	Heavy grey clay loam, Vaal River alluvial.

* In the case of soils 905-12, 1733, 1846, 267*d*, 1281, and 1282, the loss on ignition consists chiefly of *carbonic acid* from the large amount of *carbonate of lime* which these soils contain.

"Blackhead."

(Infectious Entero-Hepatitis or Typhlo-Hepatitis.)

A Disease of Young Turkeys.

By Walter Jowett, F.R.C.V.S., D.V.H. (Liv.), Department of Agriculture (Veterinary Division), Capetown.

The object of this note is to record the occurrence in Capetown and the Western Province of the above-named disease of turkeys—a disease which in many instances causes a heavy mortality amongst these birds. Up to the present the writer has met with this particular malady only in the districts named, but from the nature of the complaint it seems reasonable to assume that it may be more widely spread—it may be, in fact, that the disease occurs in several of the districts in South Africa in which turkey rearing is carried on extensively. As will be shown in the present note, "blackhead" is especially likely to be met with on premises in which poultry and turkeys are reared together on the same ground.

The writer first encountered this disease at the Cape during the latter part of 1908 (*vide Cape Agricultural Journal*, January, 1909) whilst investigating a somewhat heavy mortality which had occurred amongst a flock of valuable turkeys situated some distance from Capetown. In this particular instance a bacterial infection proved to be the cause of mortality, the disease being the one known as "Pneumo-pericarditis". But in addition to the lesions of the lungs and heart-sac which are peculiar to that disease, certain other lesions were also found present in the liver and caeca of two or three of the birds examined. These last-mentioned lesions were of some standing, and we concluded that whilst in every case the immediate cause of death had been the bacterial infection (pneumo-pericarditis) a number of the turkeys had suffered at some earlier period of their existence from the disease now under consideration ("Blackhead" or Typhlo-hepatitis).

Inquiry into the history of this particular flock of turkeys disclosed the fact that the owner had imported several "Bronze" turkeys from America some time previously, and, as the disease "Blackhead" is prevalent in certain parts of that country, we naturally formed the opinion that the malady was originally introduced into the flock with the birds which came from the United States.

Since the occurrence just recorded we have met with this disease on three or four separate occasions, the last being actually in Capetown, and since, apparently, this particular turkey disease has not hitherto been recorded in this country, we thought it advisable to publish a short description of the disease for the benefit of those

interested in turkey rearing in the Cape Province and elsewhere in the South African Union.

Synonyms.—In America the disease is popularly known as "Blackhead" owing to a peculiar dark blue or black colouration of the caruncle, "wattles", and unfeathered portions of the head which is frequently, though not invariably, apparent in infected subjects. Here at the Cape the disease seems to be known amongst some of the turkey keepers as "liver disease", a somewhat vague and unsatisfactory term.

Theobald Smith, who first studied and described the malady, named it "Infectious Entero-hepatitis", this indicating that the disease is one affecting the intestines and liver. But it is a noteworthy fact that in this particular malady it is not all the intestinal tract which is liable to be affected by the diseased process, but only a definite part of it, i.e. the lesions are limited as a rule in the case of the turkey to the caeca, and of course also to the liver; for this reason Lucet, who subsequently studied the disease, named it Perityphlo-hepatitis, and this to the writer seems by far the more appropriate designation. In this connection one may point out that the terms infectious as applied to this disease is somewhat misleading, for healthy birds may remain in close contact with diseased ones and yet not contract the complaint. The causal parasite enters the animal host only by means of soiled food, grit, or water, and so far as we know it is only by such means that a bird can become infected.

Nature and Cause of the Disease.—As just mentioned the disease now under consideration is one affecting the caeca (the two blind diverticula of the intestinal tract which lie alongside the main tube and open into the latter near its hind end) and the liver.

The causal agent is believed to be a small (microscopic) organism which is present in the diseased areas, and in the intestinal contents and "droppings" of infected birds.

If one examines stained microscopic sections of the enormously thickened caecal wall of a turkey which has succumbed to the disease, one finds the organism referred to present often in considerable numbers in the meshes of the connective tissue of the sub-mucosa, sometimes also even in the deeper layers adjoining the muscular coat.

The organism is found also in the diseased areas in the liver, especially in recent cases, lying here also in the meshes of the supporting connective tissue, and replacing the liver cells proper to a more or less considerable extent. In old standing and necrotic liver lesions these organisms are much less numerous—in such case, in fact, they may be very scanty. They are also scanty in the case of fibroid and healing areas of the disease. In such foci it is not unusual to observe the presence of multi-nucleated giant cells containing in their interior one, two, or more of the organisms. Apparently the latter have been ingested by the phagocytic giant cell by which they are in process of removal, this representing, no doubt, one of the methods of defence exerted by the host against the invading micro-parasite.

SYMPTOMS.

As we have already pointed out, the disease "blackhead" is especially encountered in young turkeys. It is particularly fatal in those from three to six weeks to three months old, but it may be met

with in poults up to six months old, and sometimes in birds even older than this. The symptoms apparently vary somewhat in individual cases, but amongst the more constant are dulness, drooping of the head, " moping ", a pendent condition of the wings and tail, and more or less loss of appetite. Sometimes, however, the appetite is not impaired, at any rate during the early stages of the disease, on the contrary it may be increased, but notwithstanding this, there is no increase of condition such as would happen under similar circumstances in the case of a healthy bird. Diarrhoea would seem to be a fairly constant symptom—and this is what one would expect from the nature of the diseased process and the organs involved therein. The " droppings " are sometimes of a greenish hue, often they are thin and watery. The caruncle (the fleshy protuberance on the head) and the unfeathered portions of the head often assume a dark blue or bluish black colour, hence the origin of the term " blackhead " which is applied to the malady by American observers; this symptom, however, as before mentioned, is not constant, moreover it may be observed in turkeys the subject of diseases other than the one now under consideration.

Some writers state that emaciation is in evidence in this disease, but personally the writer has not found this by any means a prominent symptom in any of the birds so far examined; still it may be that in the more slowly progressing forms of the malady occurring in older subjects, wasting and loss of condition may be a more prominent feature.

POST-MORTEM APPEARANCES.

On opening the abdominal cavity of a bird which has succumbed to the malady one's attention is at once arrested by the usually pronounced lesions which are as a rule noticeable in the liver, and by the generally very prominent changes which are apparent in one or other, or both, of the caeca—the blind guts which lie near the hind end of the intestine. It will facilitate matters to consider separately the appearances presented by each of the organs mentioned:—

The Liver.—Usually the liver is enlarged, often considerably so, and dotted over the surface of the red-brown organ one notices a number of circumscribed areas, sometimes of a whitish-grey colour, sometimes yellow or yellowish-brown. These diseased areas vary in size; some may be the size of a small pea, whilst others may be as large as a shilling, or even larger than this. Occasionally one or two very extensively diseased areas are encountered, whilst at other times many small spotted areas are distributed over the surface. On sectioning the liver with a knife as a rule a number of similar circular areas are seen distributed more or less evenly throughout the substance of the organ.

The consistence of the altered liver tissue comprised within these diseased areas is firm, sometimes it is inclined to be rather cheesy, at other times it is more solid, and in old, healing, or healed areas it may be quite fibrous and firm. Abscesses are not found either in the liver or elsewhere in the lesions peculiar to the " blackhead " disease.

The Caeca.—In the intestinal tract the disease is limited to one or both of the caeca. The diseased process may be distributed throughout one or both of these organs, or, on the other hand, it

may be circumscribed in patches or confined to the blind end of one or other (or both) of the caecal tubes.

When either of the caeca is uniformly affected the alteration provoked by the causal organism can hardly escape notice, even by the most casual observer. The tube is then much enlarged and its walls considerably thickened, the contents of the gut (caecum) consisting of a yellowish white or greenish pasty mass. The epithelial cells covering the mucous membrane lining the affected caeca are early shed, and the submucous tissue is enormously thickened, both by a round-celled infiltration and by an outpouring of coagulable fluid, the latter into the lumen of the gut as well as into the substance of its wall. In this part of the intestine innumerable parasites may be found, both those which are responsible for the causation of the diseased process and bacteria which are enabled to invade the substance of the intestinal wall after the protective epithelial lining has been shed; these undoubtedly complicate matters, adding to the mischief already wrought by the specific causal parasite of the disease.

In some cases the inflammatory process extends even to the outer (serous) covering of the caeca, and this part of the tube may be found thickened, reddened, and congested, or covered with a yellowish fibrinous exudate which has been poured out; this sometimes "glues" the two caecal tubes together, or to the adjacent intestine (ileum). Especially striking in the case of the turkey is the fact that the diseased process in practically every instance is limited to the caecal tubes, one or both; rarely, if ever, apparently, does it extend to the rest of the intestinal tract. The caeca no doubt forms a suitable site for the growth of the causal parasite in virtue of the stagnation, wholly or in part, which occurs in their contents. Theobald Smith looked upon the caeca as the starting point of the disease, the infection of the liver he considered secondary to that of the caeca.

Beyond the more or less well marked changes which are apparent in the liver and caeca, there may be no very pronounced alteration in the other organs or tissues of a bird which has succumbed to this disease. The morbid changes in the caeca, however, associated as they almost invariably are with pronounced evidence of disease in the liver, forms such a striking picture that it is unlikely that any one who has once seen them and is aware of their nature could confound them with the lesions of any other diseased process occurring in the turkey.

Preventive and Curative Measures.—One of the more recent writers on the subject of the "blackhead" disease (Cooper Curtice, 1907) considers his experiments have established positively that the protozoon, the causal agent of the disease, is not transmitted through the egg of the turkey. This, however, does not exclude the possibility that the egg, on its passage through the cloaca may carry the organism on its shell—should the latter come in contact with it whilst in this position (as of course it is liable to do in the case of birds which are the subject of the disease). From this it follows that although the parasite may not be directly transmitted in the substance of the egg of its host, yet it may be carried on the shell of the latter, and in due course may in this way contaminate ground, food, or water with which it may subsequently be brought in contact,

and so in time reach the intestine of a new host. The eggs of infected or suspected birds, therefore, should be wiped with a cloth which has previously been soaked in some disinfectant, or better, they may be dipped in alcohol.

Experiments conducted by the observer last mentioned (Cooper Curtice) indicate strongly that the poultry yards in the particular State of America in which he studied the disease are heavily infected, and that chickens, though rarely affected with the blackhead disease, may nevertheless be the most potent factor in the dissemination of the causal parasite. This last-mentioned observation is borne out by the present writer's experience of the disease at the Cape.

Young turkeys are especially susceptible to the blackhead disease, and it is amongst these which occur by far the greater proportion of the fatalities. Older birds, as already stated, also contract the malady at times if exposed to infection, but such adult subjects more frequently recover after passing through a more or less mild attack, exhibiting, may be, symptoms only of wasting and diarrhoea, one or both. It is important to remember, however, that such "recovered" subjects may continue to pass the causal organism of the disease in their "droppings", at any rate for some time after they have apparently recovered from the malady, and in this way they are liable to be a source of danger to other and more susceptible subjects in their vicinity.

From the foregoing it follows that (1) the infected subject, (2) the recently recovered turkey, and (3) the common fowl are all concerned in the dissemination of the causal agent of the "blackhead" disease, and young turkeys running on ground soiled with the droppings of such birds are liable to contract the disease in question.

It is necessary to bear these facts in mind when dealing with the malady, especially so when endeavouring to eliminate the disease from premises already infected.

The general measures to be adopted in dealing with this malady are as follows:—

1. In the first place it is inadvisable to attempt the rearing of turkeys on ground on which poultry are also kept. True, this course may be attended by no harmful results in certain cases, yet it would seem to be associated with a certain amount of risk, therefore it is wise to keep young turkeys apart from the fowls whenever it is possible to do so.

2. On the occurrence of the disease, or where this is suspected, all sick birds should be isolated quite apart from the healthy. If only two or three are affected and the presence of the disease is definitely diagnosed, it might be advisable to destroy the ailing birds, following this up with a general "clean-up" and disinfection of the premises.

3. Where an outbreak of the disease has actually occurred, after isolating or destroying the affected subjects, lime should be freely applied to the ground they have occupied. The surface soil of the more frequented portions of the ground should be taken up and thoroughly mixed with quicklime, or with some reliable disinfectant. It may be wise to abandon badly infected ground for a time, that is, of course, in so far as concerns further attempts to rear turkeys thereon.

Coops and buildings to which diseased birds have had access should be washed, and if possible scrubbed with water containing some reliable disinfectant. Afterwards limewash can be applied.

4. The carcasses of birds which have succumbed to the malady should be burned.

5. With regard to *curative* measures. When the disease is definitely established it is unlikely that medicinal agents administered by the mouth would be of much benefit, and certainly attempts in this direction are usually somewhat disappointing. In our experience, however, the following line of treatment has occasionally proved of some slight service:—

(*a*) Sulphate of iron dissolved in the drinking water supplied to the birds in the proportion of 10 grains to the gallon; and

(*b*) Salicylate of soda may be administered daily to the sick birds in the form of pills. Two to three grains of this drug may be safely administered as a dose.

Where, however, the disease is well established little benefit is likely to accrue from the administration of medicinal agents by the mouth.

Morse, who has experienced the disease in America, states that treatment has there been successful by the administration of sulphate of iron in pill form in half-grain doses every morning, with 2 to 3 grain doses of salicylate of soda, likewise in pill form, every evening. He recommends that such treatment be given to poults that have been exposed to the disease or that have shown the dulness, weakness, and watery faecal discharges so characteristic of the onset of the malady.

Manurial Experiments on Maize.

By H. J. Vipond, B.A., Assistant Chemist, Pretoria.

In view of the large number of interesting questions in connection with manurial treatment of our soils which have not yet received an answer, it was decided last year to start an experiment with maize on a fairly large scale, to be continued for a number of years if possible.

The department obtained the co-operation of Mr. Chas. Weir, of Koedoespoort, on whose land the experiment was carried out, and who gave it the large amount of care and attention necessary to make it a success.

The points which in our opinion required investigation were:—

1. Apart from the admitted necessity for phosphates, the best form in which to apply them. Four different phosphatic fertilizers were tried, viz., superphosphate, basic slag, ground weenen phosphate, and bone meal, and, in addition, a mixture of bone meal and superphosphate.

2. The effect of lime, applied either as ordinary slaked lime or in the form of basic slag.

3. The effect of nitrogenous fertilizers—nitrate of soda and bone meal being tried. Part of the experiment was carried out in duplicate with a mixed crop of velvet beans and mealies to test the value of the leguminous crop for enriching the soil in nitrogen.

4. The effect of potash manures.

The soil was a heavy brown loam of a type very common in the Transvaal, being derived from the shales and diabase beds of the Pretoria series lying between the Daspoort and Magaliesberg quartzites. Analyses of samples of soil from different parts of the experimental land showed it to be very uniform in chemical composition—an average analysis being given on a separate page.

To show the wide distribution of soils of a similar type in the Transvaal, I have given the analyses of twenty different soils analysed here during the past eight years. All these samples, it will be noted, have the following points in common:—

High percentage of *iron oxide* and *alumina*.
Comparatively low percentage of *lime*.
Moderate percentage of *nitrogen*.
Low percentage of *available phosphoric acid*.

The potash varies very considerably, both "*total*" and "*available*". In three samples, viz., 753, 735, and 703 the *nitrogen* is fairly high, and these soils would not be in such need of nitrogenous manure as the Koedoespoort soil.

The plots were sixteen in number and one acre each in extent (14 by 345.7 yards), the seed being sown in the first week in December.

The yields of the different plots, together with the resulting profit or loss, are given in a table on a separate page.

In the first place it will be noted that some of the manures used are generally known to be soluble and quick acting, and others are less soluble and slow acting—it is therefore quite impossible to draw final conclusions from the results of a one-year trial. This is particularly the case with manures like ground weenen phosphate, lime, basic slag, bone meal, and to a smaller extent, superphosphate and sulphate of potash, whilst even nitrate of soda has been shown in some cases to have a considerable residual value after a dry season. (See Manurial Experiments, Koedoespoort, 1907 to 1909.) Further, that part of the experiment in which beans were grown was intended to run for a number of seasons so as to furnish a test of the value of that crop for enriching the soil in nitrogen. Some of the more important points to be noticed are:—

1. Lime alone has effected a certain improvement in the crop in the first year, and would therefore be expected to prove a very valuable factor in the improvement of this land.

2. Lime and superphosphate, although they have given better results than superphosphate alone, do not show the increase expected, judging from the effect of lime alone. This may be owing to the fact that they were applied at the same time and the *lime* has caused "reversion" of the *soluble phosphate* to the less soluble condition. Such reversion would only be temporary. As a matter of fact the plot receiving superphosphate alone grew slightly better at the start.

3. Basic slag (double dressing) has produced a very much greater increase than a single dressing of superphosphate and at the same time a slightly greater profit. In only remains to be seen whether it will have an equally great residual effect the following year, in which case it will have shown itself to be very much better than superphosphate for this type of soil.

4. Ground weenen phosphate is a fertilizer to be reckoned with, as a dressing of 1000 lb. has given quite as good results the first year as 200 lb. superphosphate, and being above all things a slow-acting fertilizer it ought to keep this up for quite a number of years.

5. Bone meal is one of the best fertilizers for the maize crop. In this instance the sample of bone meal used had been kept over from the previous year and was well decayed, and consequently its nitrogen, and probably also its phosphates, were in a more readily available condition than usual. One would therefore not expect it to give quite such good results in succeeding years. The substitution of 100 lb. superphosphate for 200 lb. of the bone meal has not been a success, probably owing to the phosphates and nitrogen being properly balanced in the bone meal, the substitution of superphosphate disturbing the balance.

6. Nitrate of soda—150 lb. used in conjunction with 200 lb. superphosphate—has caused an increase of 260 lb. equal in value to only half the cost of the manure. This dressing was probably too large, considering that only 200 lb. of superphosphate was used, but in any case the results obtained with nitrate of soda in this and other experiments on maize have not been so good as one would expect. In this case 100 lb. were applied at time of sowing and the remaining 50 lb. about a month or six weeks afterwards.

7. Sulphate of potash has had an injurious effect on the crop, and this points to the soil being sufficiently rich in available potash for the growth of maize (see analysis of the soil on page 622). This injurious

effect of potash manures when used in excess has been established in a number of other cases in different countries.

The experiment was carried out on a large scale in order to eliminate errors due to minor inequalities in the soil, such as the occurrence of antheaps, of which there were a number. The soil was broken up for the first time in the preceding March and ploughed again in November, and its somewhat unkindly nature, combined with the dryness of the growing season, were responsible for rather poor crops. On the other hand the plots were well cultivated right through the season, so that they were given the best possible chance under the prevailing conditions. In spite of this being the first crop on the land a little "red weed" was to be found here and there, and although it was removed by hand it gives us cause for anxiety as to possibility of continuing the experiment as long as we would otherwise like.

Owing to the dry season and the restricted growth there should be a larger residue from the manures for the following season, so that one might expect even the nitrate of soda to have a considerable effect next year.

The analyses given on page 622 show in every case very low percentages of available phosphates, and this is found in the majority of our soils to be associated with a low ratio of lime, to iron, and alumina. One of the principal objects of the experiment therefore was to investigate the action of lime on such soil to see if it is possible by this means to set free the phosphoric acid from combination with either the iron or alumina, and also to see whether there was any reason to suppose that the use of soluble acid phosphates (superphosphate) on such soils resulted in withdrawal of the phosphoric acid by the iron oxide or alumina with formation of the very insoluble phosphates of iron and alumina (phosphate of lime, on the other hand, being much more readily soluble). If this should take place then insoluble phosphates such as basic slag, bone meal, etc., would be more suitable and profitable. To make this more clearly understood it should be pointed out for the benefit of those who do not know that superphosphate consists of a soluble acid phosphate (with other materials which need not be taken into account). If such phosphates remained in the soluble condition in the soil they would be liable to be carried away in the drainage, but, as a matter of fact, when they come into contact with the lime in the soil they combine with it to form a different phosphate of lime which is scarcely soluble in pure water but fairly easily soluble in water containing carbonic acid, and readily available to crops. Where there is a very large amount of iron oxide or alumina in the soil and very little lime there is no doubt that the soluble phosphates combine to some extent with the former to produce phosphate of iron and phosphate of alumina, both of which are much less soluble than phosphate of lime.

No attempt was made to estimate the quantity of beans produced on the first six plots, but the crop was small, the best being that which had received basic slag. Altogether, however, it represented a good deal of valuable stock food. The method of growing the beans and mealies together was adopted simply because it has now been tried on this farm for a number of years and proved very successful, being especially suited to the kind of farming practised, i.e. dairy farming. Other farmers might find it more suitable to grow the crops in rotation.

The experiment seems to show that even on newly-broken land of this kind nitrogenous manure has had a very considerable effect; how much more will this be the case on lands which have been exhausted by several years' cultivation of mealies, since experience has shown that the nitrogen is the first ingredient to fail under such conditions. The problem, therefore, is to find a cheap source of nitrogen. In bone meal we certainly have one of the best and cheapest sources, but how long will the supply last or the price remain within reasonable limits. The supply of Government guano is also of a limited nature, although the price fixed is very low. It seems, therefore, that it will be necessary in many cases to fall back on the growth of leguminous crops, which method, in order to be most successful, must be coupled with stock farming.

ANALYSES OF TWENTY SOILS FROM DIFFERENT PARTS OF TRANSVAAL.

(All of similar type to the soil on which the experiment has been laid down at Koedoespoort.)

No. of sample :—	1974 to 1979.	24.	679.	703.	735.	753.	1261.	1352.	1389.	1404.	1453.	1671.	1741.	1760.	1829.	1851.	1936.	1954.	2034.	2037.
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Stones (over ⅛ in. in diameter)..	Nil	0·34	5·2	Nil	0·1	0·1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	1·5	12·3
Composition of air-dry fine earth: Moisture	3·11	3·60	1·85	1·85	4·15	2·56	3·33	2·30	1·84	1·42	1·65	3·05	5·10	2·02	3·96	11·81	3·61	7·08	2·25	3·60
Loss on ignition (organic matter, etc.)..	8·26	9·00	7·63	13·40	10·94	8·98	7·86	7·72	8·16	7·93	6·62	6·28	7·31	10·46	6·16	10·68	8·12	6·82	12·12	8·77
Insoluble matter	60·20	57·73	65·24	56·09	59·93	68·49	67·34	65·30	72·77	72·46	74·69	66·81	66·74	60·84	69·48	44·91	61·05	67·27	52·52	52·56
Iron oxide and alumina......	27·77	29·51	25·04	28·19	24·70	19·34	20·70	23·98	16·95	17·93	17·38	23·20	19·95	26·84	20·65	32·02	26·69	19·28	32·66	35·33
Lime..........	·15	·29	·05	·07	Trace	·27	·11	·18	·10	·06	·07	·08	·14	·04	·04	·27	·25	·10	·23	·26
Magnesia......	·22	·27	·09	Trace	Trace	·18	·15	·19	·09	·08	·09	·08	·05	·07	Trace	·51	·08	·09	·11	·22
Potash........	·12	·20	·10	·15	·41	·25	·32	·09	·12	·14	·15	·11	·19	Trace	·14	·05	·13	·05	·13	·11
Phosphoric acid	·03	·09	·07	·21	·05	·08	·08	·07	·03	·07	·03	·07	·05	·04	·13	·03	·07	·02	·06	·05
TOTALS..	99·86	100·69	100·07	99·96	100·18	100·15	99·89	99·83	100·06	100·09	100·25	99·67	99·58	100·31	100·56	100·28	99·88	100·71	100·08	100·90
Nitrogen.......	·106	·127	·090	·174	·169	·141	·088	·088	·122	·105	·086	·081	·116	·091	·092	·098	·084	·126	·122	·105
Available potash	·0068	·0043	·0032	·0048	·0359	·0077	·0044	·0051	·0043	·0039	·0092	·0156	·0185	·0027	·0016	·0028	·0155	·0113	·0069	·0038
Available phosphoric acid...	·0007	·0027	·0023	·0020	·0010	·0026	·0023	·0028	·0015	·0020	·0020	·0007	·0010	·0017	·0024	·0019	·0013	·0014	·0005	·0005
	Average of five samples from experimental plots, Koedoespoort.	Todd & Harris' Nurseries, Barberton, Barberton Dist.	Rondebosch No. 178, Middelburg Dist.	Tzaneen Estate, Zoutpansberg Dist.	Piet Retief Dist.	Zwaartlaagte, Boons Siding, Rustenburg Dist.	Arnoldistad, Rustenburg Dist.	Doornhoek No. 241, Waterval Boven, Carolina Dist.	Driefontein, Piet Retief Dist.	Rietfontein No. 286, Zuurfontein, Pretoria Dist.	Palmietfontein No. 7, Natal Spruit, Witwatersrand Dist.	Grootgeluk No. 116, Godwan River, Barberton Dist.	Deeside No. 2335, Springbok Flats, Waterberg Dist.	Murphy's Station, near Mbabane, Swaziland.	Driehoek No. 12, Ermelo Dist.	Onverwacht No. 90, Ermelo Dist.	Witpoort, Middelburg Dist.	Tweefontein No. 232, Bronkhorstspruit, Pretoria Dist.	Wemmershoek No. 315, Lydenburg Dist.	Scheerpoort No. 269, Pretoria Dist.

TABLE SHOWING YIELDS PER ACRE OF DIFFERENT PLOTS AND PROFIT OR LOSS THEREON, KOEDOESPOORT, 1910–11.

Plot.	Manurial Treatment per Acre.	Yield of Maize per Acre.	Increase due to Manure.	Value of Increase.	Cost of Manure.	Profit or Loss per Acre.	Proposed Manurial Treatment following Year per Acre.
		lb.	lb.	£ s. d.	£ s. d.	£ s. d.	
1	600 lb. slaked lime........................	625	186	0 8 4	1 1 0	Loss... 0 12 8	Nothing.
2	600 lb. slaked lime; 200 lb. superphosphate	898	459	1 0 8	1 15 0	Loss... 0 14 4	200 lb. superphosphate.
3	100 lb. weenen phosphates................	837½	398½	0 18 0	1 17 6	Loss... 0 19 6	Nothing.
4	200 lb. superphosphate.....................	813	374	0 16 10	0 14 0	Profit. 0 2 10	200 lb. superphosphate.
5	400 lb. basic slag..........................	1106	667	1 10 0	1 6 0	Profit. 0 4 0	Nothing.
6	No manure..................................	439	—	—	—	—	Nothing.
	Plots 1 to 6 carried a mixed crop of velvet beans and mealies, sown together in the rows, which were 3 ft. 6 in. apart.						
7	1000 lb. weenen phosphates...............	1224	562	1 5 3	1 17 6	Loss... 0 12 3	Nothing.
8	No manure..................................	662	—	—	—	—	Nothing.
9	600 slaked lime.............................	896	234	0 10 6	1 1 0	Loss... 0 10 6	Nothing.
*10	600 lb. slaked lime; 200 lb. superphosphate	1214½	552½	1 4 10	1 15 0	Loss... 0 10 2	200 lb. superphosphate.
11	400 lb. basic slag..........................	1497½	835½	1 17 7	1 6 0	Profit. 0 11 7	Nothing.
12	200 lb. superphosphate.....................	1199½	537½	1 4 2	0 14 0	Profit. 0 10 2	200 lb. superphosphate.
13	400 lb. bone meal..........................	1612	950	2 2 9	1 8 0	Profit. 0 14 9	Nothing.
14	200 lb. superphosphate; 150 lb. nitrate of soda	1459½	797½	1 15 11	1 16 6	Loss... 0 0 7	200 lb. superphosphate; 100 lb. nitrate of soda.
15	200 lb. bone meal; 100 lb. superphosphate	1305	643	1 8 11	1 1 0	Profit. 0 7 11	100 lb. superphosphate.
16	200 lb. superphosphate; 150 lb. nitrate of soda; 100 lb. sulphate of potash	1336	674	1 10 3	2 12 6	Loss... 1 2 3	200 lb. superphosphate; 100 lb. nitrate of soda; 50 lb. sulphate of potash.
	Plots 7 to 16 carried mealies only; rows 3 ft. apart.						

* Plants partially eaten by grub.

Dairying in South Africa.

By J. D. Th. Wiese and Richd. Ronaldson.

Perhaps in no other industry in South Africa has of late greater development taken place than in dairying. This recent development is owing to the fact that the people of this country have awakened to the possibilities of South Africa as a dairying country. Enormous sums of money have been going abroad every year for butter imported from the other Colonies, which, as a matter of fact, are no better adapted for dairying than our own. It was not until the beginning of the present century that steps were taken to establish the industry here, and the first few factories erected in the country were in the nature of experiments. These were conducted with varying success, but their existence has proved beyond all doubt the advantage of the industry not only to the farmers but to the general public of this great sub-continent.

We have only to consider the recent enthusiasm and activity displayed in the establishment of butter factories nearly all over the country and the enormous increase in the output which has taken place within the last few years to be convinced that South Africa has arisen from her hitherto sleepy condition as regards dairying into active life. Although South Africa is only in its infancy in respect of this class of product, everything seems to indicate that an era of prosperity is opening before us, and that the agricultural and commercial communities of this land are soon to take a prominent part in the dairying of the world. This country possesses all the natural features essential to success in such an industry, the natural pastures are second to none, the soil and climate throughout the country are all that can be desired for the production of foodstuffs suitable to dairy cattle giving a first quality raw material. Considering then these natural advantages, our concern at the present juncture should be the fostering, promotion, and particularly the betterment of this industry as regards the production of a first grade marketable article. Our demand for butter still exceeds the production, but having regard to the improvement in the class of dairy cattle and the erection of butter factories throughout the whole Union, it is evident that we shall, in a few years' time, not only produce sufficient for our own consumption but shall have to find a market oversea for our dairy produce if the industry is naturally to expand, and if we are to compete successfully with other countries who have been for years in this business, our endeavour must be the production of a better article than at present. We have a great advantage over other dairy countries in that we can benefit from their experience and avoid many mistakes into which they as pioneers so naturally fell. We must adopt the most approved scientific methods, methods which took these countries years and cost large sums of money to perfect. We must be careful to avoid such mistakes as were made a few years ago when a consignment of damp

and unsorted mealies thrown on the European market seriously injured our reputation as a mealie-growing country and struck us a blow from which it will take time to recover, for when the time comes to export our first consignment of butter, unless it is really tip-top, we may suffer such a discomfiture as was experienced in the grain industry so recently, and as this would directly affect the farmer, it is to his advantage to take every precaution to avoid such a calamity. We are but beginners recognizing that there are difficulties to overcome, but we can, possessing as we do the knowledge and experience gained for us by other countries, set about overcoming these difficulties with confidence and look with hope to the future. Many, perhaps, will say that to speak of exporting butter is premature, but the next few years will prove to us what an advantage it would have been if we had started earlier to qualify ourselves for the export trade, as everything points to the probability that, in the near future, we shall have to compete in oversea markets. We shall be wise then if we take immediate steps to improve the quality of our butter, for we will not only reap an immediate advantage in the shape of an enhanced price in the South African market, but we will gradually be growing into that higher efficiency in the art which we will be called upon to exercise in the capacity of exporters. Considering these possibilities, we are naturally faced with the question: "How can we improve the quality of our butter?" The first essential is more careful treatment of the milk and cream on the farm. The success of the dairying industry almost entirely lies with the cream suppliers; no matter how skilled the butter-maker may be, he cannot manufacture a first-class article if the raw material is in a defective state. It has wisely been said that a butter factory is well enough as a result, but it is rarely a primary force for the advancement of sound dairy practice. The farmer himself must be possessed of a sound dairy knowledge; that done, success will crown his efforts and butter factories will follow as a natural result. It will only be by ceaseless striving to adopt the best methods that we can hope to improve our dairy industry and establish a reputation in the markets of the world. There is no doubt that amongst farmers generally there is a lack of knowledge as to the real causes of fermentation in milk and cream. Pamphlets are from time to time issued from various creameries regarding the sanitary handling of these products, but from these the farmer seldom gathers an intelligent conception of the bacteriological principles involved; for instance, we are approached at times by farmers who cannot understand why their cream is classed on one occasion first grade, and again on another occasion when (as it appeared to them) the cream had had exactly the same handling and treatment it is classed second grade. Many farmers labour under the impression that temperature is the only consideration in the production of good or bad cream irrespective of the germ content, and that is why we have come to the conclusion that if farmers can but obtain a general knowledge of the action of bacteria on these products they will be placed in a position to think and reason for themselves on these matters. It is our experience that farmers are always willing to accept advice as to the proper methods of handling milk and cream. It is our object in this paper, therefore, first to give farmers an idea of the action of bacteria on these products and then to set forth a code of instructions which, in the light of this knowledge, he will carefully and intelligently carry out.

Cleanliness is the first and most important law in all dairy practice. Cleanliness, as applied to dairying, is intelligent cleanliness in the light of an elementary knowledge of the laws of bacteriology which plays so great a part in all scientific dairying. It is most important that everything with which the milk comes in contact from the time it is drawn from the udder of the cow until it reaches the factory should be in a thorough sanitary condition. Milk and cream become contaminated owing to the presence of dirt of various descriptions through careless handling of the animals, the dairy utensils, or through the unsanitary or uncared for state of the kraal or dairy. When milk sours on a hot day it is usually believed to be caused by the heat. Now the high temperature of itself does not sour the milk but gives life and support to the millions of organisms already present in the milk, and these last mentioned are the cause of fermentation. For example, every intelligent housekeeper knows from experience that if milk is heated to boiling point it will keep much longer than milk not so treated. The heating of the milk has destroyed the bacteria present in it. If the milk is allowed to stand in an open vessel the temperature of course falls gradually to that of the surrounding air, and on a summer's day with the thermometer at, say, from 75° to 80° F., a fresh supply will soon be attracted to it from the surroundings, and the milk on the following day may be sour again. If, however, we should sterilize a bottle, fill it with good fresh milk which has been heated to about 190° F., and then seal the bottle so as to render it perfectly air-tight, we will find that the milk contained in this bottle will be quite good even at the end of a week, although the bottle and its contents may have been exposed to varying temperatures. This simple illustration will serve to prove that it is not the heat which sours the milk but the germ attracted to it from the surroundings at certain temperatures.

These germs, or bacteria as they are called, are microscopic fungi; the number of species already known are so great that there are probably as many in nature as there are flowering plants on the globe, and as in plants we find some adapted to the mountain, some to the valley, some to the equator, and some to the colder regions, so amongst bacteria one kind of food and environment is more suitable to the one species than to the other.

As to structure, bacteria stands practically on the lowest plane of vegetable life. In common with all other organisms they are affected by external conditions, favourably or unfavourably; certain conditions must prevail before development can take place, thus these organisms must be supplied with an adequate and suitable food supply and with moisture, and the extent of their activity depends on the temperature.

Milk fulfils all these conditions and constitutes all the properties essential to make a complete food, viz., water, proteid, carbohydrate, fat, and salt, and therefore suits all these requirements in composition, and at the temperature it is drawn from the cow's udder is specially favourable to bacterial developments.

If we look at a ray of sunshine passing in at the door or window, even on a calm day, we may form some idea of the amount of dust which abounds in the atmosphere. If, however, we can make a more minute examination with a microscope we would at once be able to see something of the mysteries of germ life. These germs gain access to

the milk or cream through the dust particles. Although invisible to the eye the atmosphere is full of them; they are found everywhere. The different kinds and quantities depend to a great extent on the surroundings. Bacteria play a very important part in butter and cheese making; the quality of the finished article will largely be determined by the species of bacteria that are in the ascendency. The fermentation which takes place when milk sugar is converted into lactic acid is a desirable fermentation, if under control, and the germ that causes it is a desirable germ. This process is absolutely essential for a good flavoured butter that will keep well. On the other hand we find species of putrefactive and butyric types which are not only undesirable but detrimental to the quality and flavour of butter.

The predominating species will be determined by the treatment the milk and cream receive.

If cared for in a clean, sanitary manner, the desirable germs will prevail and monopolize the bacterial action in the product, but if handled in a careless or unclean manner the opposite will certainly result.

The foregoing will explain to many the apparently erratic grading of their cream, and, incidentally, proves the desirability of the cream supplier having a knowledge of the action of bacteria on it.

It behoves every farmer to take the proper steps to have as few undesirable germs in his products as possible, and thereafter to control their development by cooling the cream to such a temperature as will impede their rapid growth.

Next to cleanliness, and almost of equal importance, is the *regulation of temperatures*. A knowledge of the influence of varying temperatures on bacterial growth is essential, nay, imperative, to every intelligent dealer in milk and cream if he would place at the factory or on the market a high-grade article; more especially is this the case in South Africa, where, within a comparatively small agricultural area, is found many varying altitudes and climates. As we have previously stated, the rapidity of bacterial growth is largely dependent on temperature. Temperatures between 70° and 90° F. are specially favourable to it; at temperatures between 50° and 60° F. the bacteria are less active, and at 45° F. and under they seem to exist in the product in a more or less dormant condition, hence the importance of cooling the milk or cream as much as possible so as to render the germs, if not wholly, to a certain extent, inactive.

The dairy farmer must ever remember that the amount the cream is cooled below 70° F. is the measure of the retardation of fermentation in that product.

To apply such methods as are involved at the present day in great dairying countries like Denmark or New Zealand, where cows are housed in stables having cement floors with whitewashed walls, these being cleaned twice daily, the cows carefully groomed and rationed with the most scrupulous care suitable for obtaining the quantity and quality of milk desired, would seem absurd to the South African farmer at the moment. Still the fact that these countries, as yet so far ahead of us, are continually trying to improve even on these advanced methods should be an incentive to us to bestir ourselves in the direction of an improvement of our South African methods.

Let every farmer be most particular in keeping the kraal, or the place where milking is done, in a clean and wholesome condition.

We have known of cases where dung has not been removed from the kraal from one year's end to the other; thanks to the disinfectant effect the sun has on *many* germs or the fact of a kraal being in such a condition would inevitably be reflected in a third grade cream.

Let a bucket of warm water accompany the milkers in which to wash their hands after milking each cow. A damp cloth should be used to remove the loose hair and dust from the flanks and udders of the cow. The milker should be clean in person and in clothing. Milk pails should never be left open at the kraal during the process of milking, as the dust which rises from the movements of the cows will soon settle in the milk, and with it thousands of bacteria. A can with a lid is preferable, as such can be closed after each filling. It is advisable to milk with dry hands, as any hair or dirt dropped into the milk can be removed with a strainer, whereas if the hands are wet it is dissolved and cannot be so recovered. Damp hands are also liable to cause chaps on the teats.

Colostrum, or milk from newly-calved cows, should not be used till after the seventh or eighth day, as a very small proportion of cream from such milk is enough to give the bulk of cream to which it is added a repugnant smell, and will of course be injurious to the butter.

Separate the milk as soon after milking as possible, or, better still, start the separator while the milking is going on, as the milk direct from the cow will give a better result as regards clean skimming, and, besides, the cream can be cooled sooner, which will greatly assist in checking the development of germs.

A Farm Dairy.—A farm dairy can be erected at a very moderate cost. A rondavel with thatched roof and dust-proof ceiling will answer the purpose admirably and is within the reach of every farmer, or if the farmer can afford it let him build a thick-walled stone or brick building with a floor of concrete or flat stones; if of the latter, the seams should be carefully pointed with cement.

Air and Coolness.—Fresh air and coolness are essential in the dairy, and the windows and ventilators should be put in with a view to this. The walls inside should be whitewashed at least twice a year with lime, which is a preventive against bacterial growth. The floors should be scoured regularly with a solution of hot water and soda, as the milk which is continually being spilt is a source of attraction for germs if left for any time.

As milk and cream absorb odours, it is imperative that the dairy and surroundings be free from these.

The dairy should not be used for any other purpose. Under no circumstances should it be used as a general store for meat, etc.

Scrupulous care should be exercised in the thorough cleansing of *dairy utensils and separator parts.* This work should only be done by children or natives under the supervision of their elders. A native has not the slightest idea why the water used in washing these should necessarily be at boiling point. It is impossible for the eye to detect whether these have been properly washed or not. If they have been insufficiently washed, fermentation soon sets in, and when fresh milk or cream is put into such vessels again it is immediately attacked by the harmful germs and will in a short time become sour or tainted. In washing dairy utensils, etc., soda and water can hardly be too freely used. This solution kills all living germs. It is a good practice to expose separator parts and milk pails to the sun for a few hours every day.

There are many different ways of cooling milk on the farm, and it is therefore difficult to specify any one method. The farmer should endeavour to make the best use of the facilities he has at hand. Where cool spring water is available the can of cream can be placed in a tub of this and the water changed occasionally. If the can of cream is placed outside in the cool of the evening and taken in early in the morning it will greatly assist in keeping the temperature of the cream down. These two simple methods are within the reach of nearly every farmer, and may very profitably be used in conjunction with each other.

Stir the cream regularly every time a fresh lot is added. If cream has received adequate attention in this respect, the difficulties of having it properly cared for in transit may be easily overcome. Cream during the summer months should be transported to the station or factory either early in the morning or late in the afternoon. Where this is impossible a wet bag wrapped round the can will prove of great advantage in keeping the cream cool and protecting it from the rays of the sun. These bags should be put on so that they can easily be renewed, as the bags when left on for any considerable time will become contaminated with germs, etc., owing to the milk and cream being spilt on them.

Where cream wagons have to travel long distances it is best to leave the terminal station late in the afternoon and travel until dark and early the following morning so as to reach the factory not later than 8 or 9 a.m. Where cans of cream are put down along the road for wagons to pick up, a small shelter of sods can easily be erected to protect the cream from the sun in the event of the wagon not being to time.

Where the cream has to *travel by railway*, the importance of it being protected from the sun should be impressed upon the railway administration and their officials, as there is no doubt that cream seriously suffers by being left exposed on railway platforms, when at little cost suitable shelters might be provided where there is much traffic in this class of product.

In submitting these views concerning the prospects of dairying in South Africa, and indicating the direction in which we may effect an improvement in this class of product sufficiently not only to warrant its universal use in this country but to qualify it for an export trade, we do so with but one end in view—to see South Africa take the place for which by nature she is so lavishly endowed in the dairying business of the world.

Our slight incursion into the domain of bacteriology, couched as it is in the simplest language, we trust will prove, not only intelligible, but interesting and useful to all engaged in dairy farming. If the agricultural population of South Africa generally can be aroused to the possibilities of this business, the time for advance agents, who have at times a hard task in persuading the farmer to become a cream supplier and so substantially increase his income, an increase to which he has hitherto been blind, will soon have passed, and the dairying communities of the different districts of the Union of South Africa will be organizing, co-operating, and consolidating their interests and so creating and stimulating a healthy rivalry between different districts and provinces in regard to the dairy industry, a state of affairs which augurs well for our agricultural and commercial future.

Government Importation of Stock.

LAST May Mr. J. D. Borthwick, Acting Assistant Principal Veterinary Surgeon (Cape), was detailed by the Union Government to proceed to Europe for the purpose of selecting and purchasing stock for the several agricultural schools and stud farms. The stock comprised eight thoroughbred stallions, two Percheron stallions and five Percheron mares, two Clydesdale stallions, one Shorthorn bull and nine heifers, one Hereford bull and nineteen heifers, one Oxford Down ram and twenty ewes, one Shropshire ram and one Suffolk ram, one Berkshire boar and four gilts, five Catalonian jacks and eight jennies. All of the stock (with the exception of two jacks and one jennie, two of which died on the voyage and one just after arrival at Capetown) arrived in good condition and have been sent to their various destinations.

The thoroughbred horses were selected with a view to their suitability for getting good saddle and cart horses more than from a racing point of view, but from a perusal of their pedigrees it will be seen that they are not deficient in blood. Amongst them is a son of the celebrated Flying Fox, a horse of perfect symmetry and nice quality. The Phœnician, a bay of the hunter stamp, and one likely to prove himself a good sire of useful utility horses. He won the Maiden Plate at the Curragh and the Kilbride Welter Handicap at Phœnix Park. He also was second in the Beresford Stakes at the Curragh, third in the Baldoyle Derby, and a second to Bachelor's Double in the Irish Derby. Sir Charles, a winner of several King's Premiums, is a real good one, with strong back, loins, and quarters, standing on the best of legs and feet; he is a perfect mover, and has a docile temper.

The following are the pedigrees of the thoroughbred stallions:—

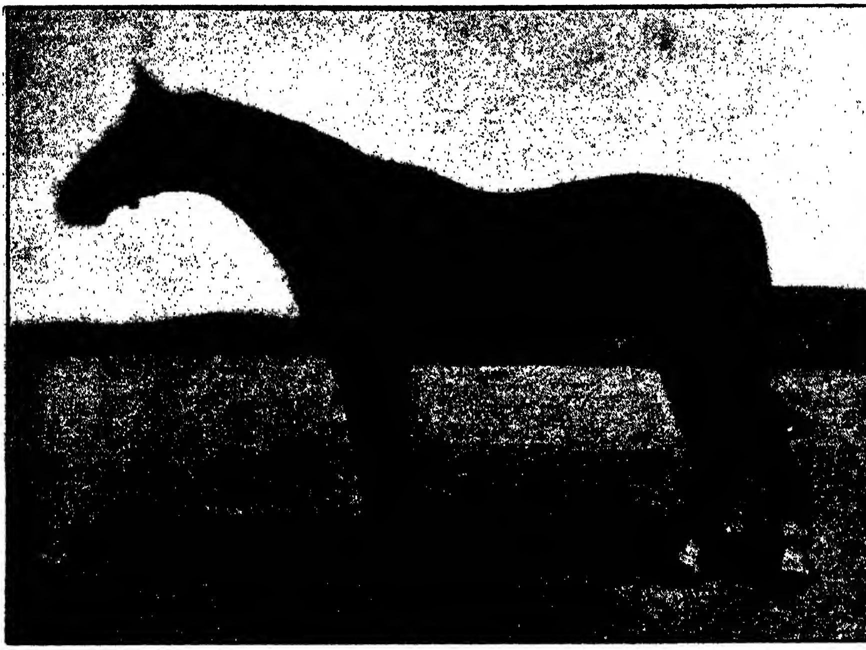
"WHYTE MELVILLE."

Chestnut Horse.

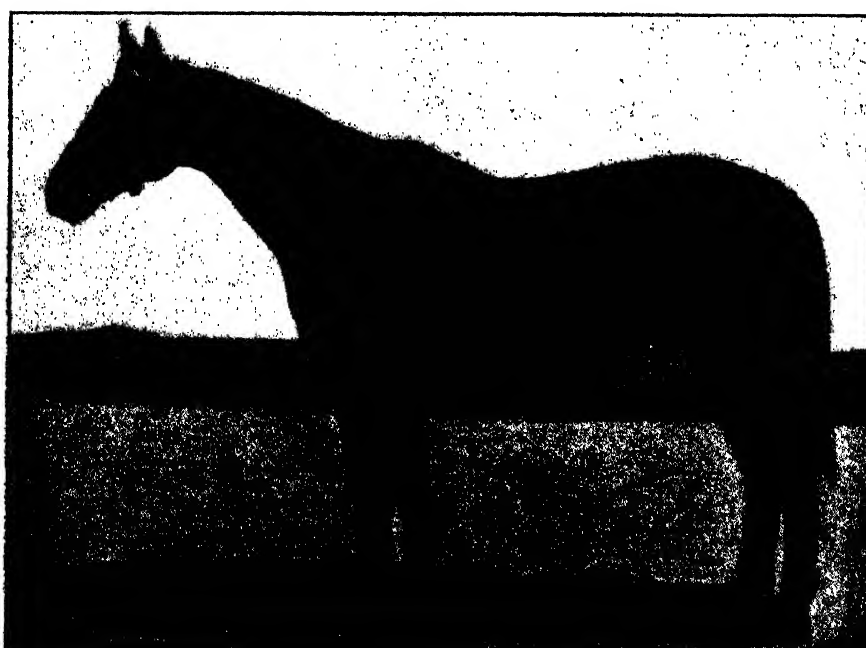
Bred by Lord Wolverton in 1905.

WOODBERRY.				FLYING FOX.			
The Widgeon.		Crowberry.		Vampire.		Orme.	
Nu.	Uncas.	Lizzie Lindsay.	Rosebery.	Irony.	Galopin.	Angelica.	Ormonde.
Orpheus. Lambda.	Stockwell. Nightingale.	Scottish Chief. Agility.	Speculum. Ladylike.	Rosebery. Sarcasm.	Vedette. Flying Duchess.	Galopin. St. Angela.	Bend Or. Lily Agnes.

Government Importation of Stock.



Thoroughbred Stallion, "Whyte Melville"



Thoroughbred Stallion, "The Phœnician"

"THE PHŒNICIAN."

The Israelite.				Grebe.			
Esther.		Isosceles.		Greeba.		Bend Or.	
Gazelle.	Arbitrator.	Belphoebe.	Isonomy.	Sunrise.	Melton.	Rouge Rose.	Doncaster.
Ivan. Antelope.	Solon. Trueheart.	Toxophilite. Vaga.	Sterling. Isola Belle.	Springfield. Sunray.	Master Kildare. Violet Melrose.	Thormanby. Ellen Horne.	Stockwell. Marigold.

"TIRIPAPA."

Tiraillerie.				Collar.			
Florence Macarthy.		Nordenfeldt.		Ornament.		St. Simon.	
Lady Morgan.	Macaroni.	Ostwith.	Cymbal.	Lily Agnes.	Bend Or.	St. Angela.	Galopin.
Thormanby. Morgan la Faye.	Sweetmeat. Jocose.	Wenlock. Sister to Byshworth.	Kettledrum. Nelly Hill.	Macaroni. Polly Agnes.	Doncaster. Rouge Rose.	King Tom. Adeline.	Vedette. Flying Duchess.

"NINIAN."

Limonite.				Ninus.			
Hematite.		Clairvaux.		Nina.		Sheen.	
Miss Somerset.	Vulcan.	Devotion.	Hermit.	Music.	Lowlander.	Radiancy.	Hampton.
King of Trumps. Effie Dean.	Thunderbolt. Alarum.	Stockwell. Alcestis.	Newminster. Seclusion.	Stockwell. One Act.	Dalesman. Lufra.	Tibthorpe. Meteor.	Lord Clifden. Lady Langden.

"IRON PIRATE."

Spoil.				Sir Geoffrey.			
Kruis Keen.		Forager.		La Vierge.		St. Angelo.	
Weatherwise.	Fetterlock.	Cantiniere.	Adventurer.	Elizabeth.	Hampton.	Agneta.	Clairvaux or Galopin.
Weatherbit. Antonia.	Parmesan. Silverhair.	Stockwell. Cantine.	Newminster. Palma.	Statesman. Fair Rosamond.	Lord Clifden. Lady Langden.	Macaroni. Fair Agnes.	Hermit. Vedette.

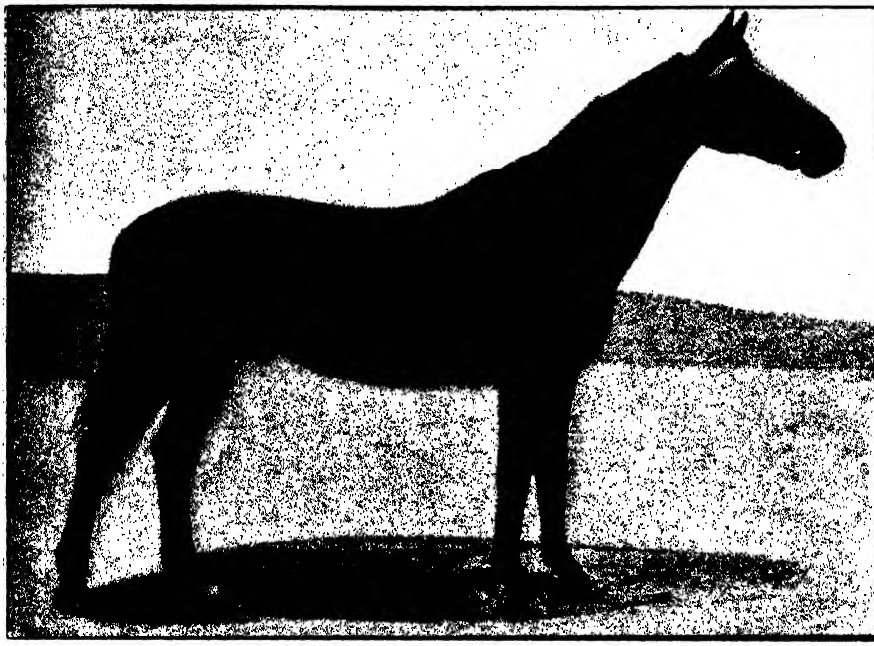
"SIR CHARLES."

<table>
<tr><th colspan="4">Green Rose.</th><th colspan="4">Kendal.</th></tr>
<tr><td colspan="2">Celandine.</td><td colspan="2">Springfield.</td><td colspan="2">Windermere.</td><td colspan="2">Bend Or.</td></tr>
<tr><td>Crocus.</td><td>King Tom
or
Macaroni.</td><td>Viridis.</td><td>St. Albans.</td><td>Miss Agnes.</td><td>Macaroni.</td><td>Rouge Rose.</td><td>Doncaster.</td></tr>
<tr><td>Thormanby.
Sunflower.</td><td>King Tom.
Constance.
Sweetmeat.
Jocose.</td><td>Marsyas.
Maid of Palmyra.</td><td>Stockwell.
Bribery.</td><td>Bird Catcher.
Agnes.</td><td>Sweetmeat.
Jocose.</td><td>Thormanby.
Ellen Horne.</td><td>Stockwell.
Marigold.</td></tr>
</table>

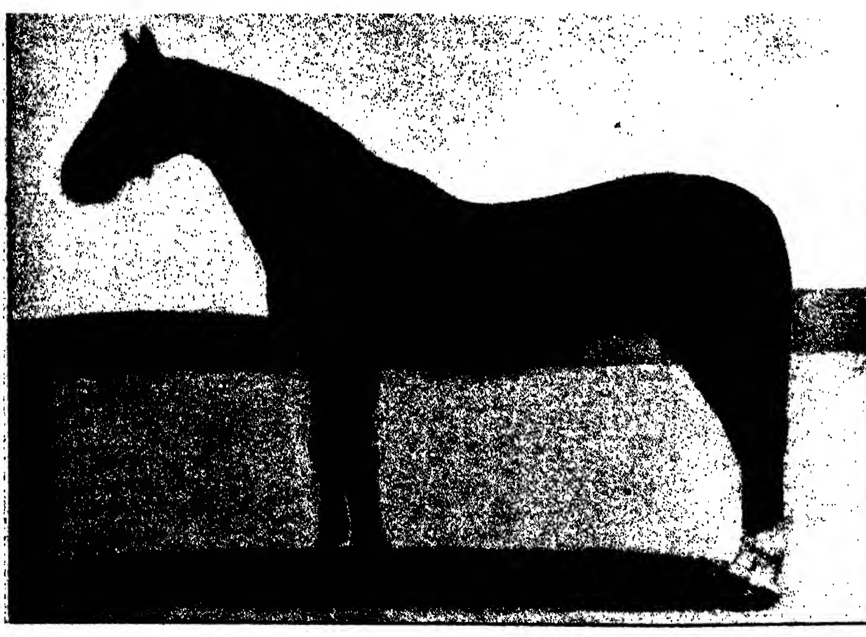
"BARKSTON ASH."

<table>
<tr><th colspan="4">Impi.</th><th colspan="4">Pride.</th></tr>
<tr><td colspan="2">Ambuscade.</td><td colspan="2">Chittabob.</td><td colspan="2">Superba.</td><td colspan="2">Merry Hampton.</td></tr>
<tr><td>Cross-fire.</td><td>Camerino.</td><td>Jenny Howlet.</td><td>Robert the Devil.</td><td>Highland Fling.</td><td>Sterling.</td><td>Doll Tearsheet.</td><td>Hampton.</td></tr>
<tr><td>Vedette.
Crosslanes.</td><td>Stockwell.
Sylphine.</td><td>The Palmer.
Jenny Diver.</td><td>Bertram.
Cast Off.</td><td>Scottish Chief.
Masquerade.</td><td>Oxford.
Whisper.</td><td>Broomielaw.
Mrs. Quickly.</td><td>Lord Clifden.
Lady Langden.</td></tr>
</table>

Government Importation of Stock.



Thoroughbred Stallion, "Sir Charles".



Thoroughbred Stallion, "Barkston Ash"

"GIPSY BOY."

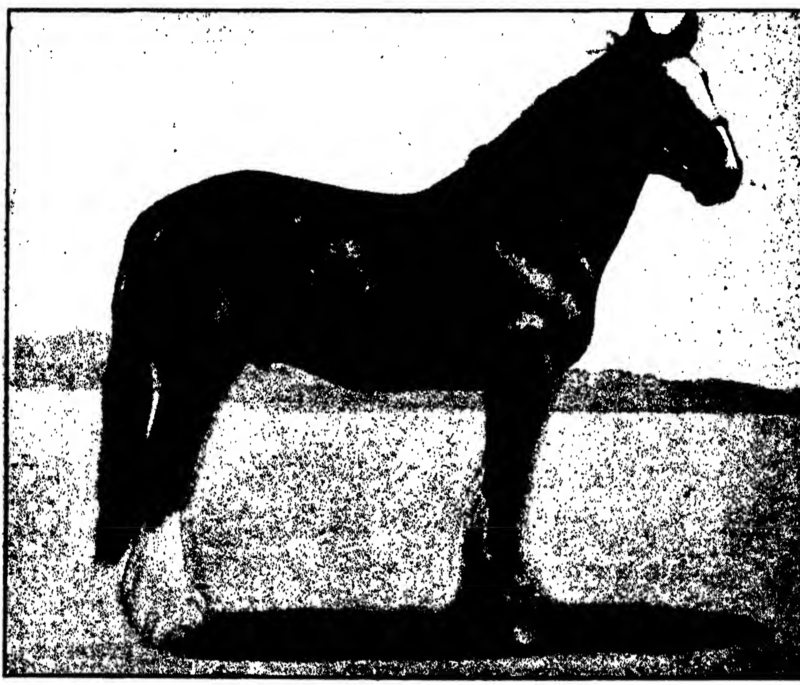
HESITATION.	Sapienza.	Wisd	Conoma.
			Solon.
		Favo.	Adrasti
			Favoni
	Masterman, or	Dissipation.	Late Night.
			Scottish Chief.
		Master Kildare.	Silk.
			Lord Ronald.
	The Old Buck.	Rococo.	Rowena.
			Gemma di Vergy.
		Rampage.	Romping Girl.
			Hermit.
PAST MASTER.	Bye and Bye.	Fair Unknown.	Souvenir.
			Adventurer.
		Bend Or.	Rouge Rose.
			Doncaster.
	Freemason.	Geheimniss.	Nameless.
			Rosicrucian.
		Barcaldine.	Ballyroe.
			Solon.

The Percheron horses and mares were purchased in the district around Nogent-le-Rotrou in France, which is the centre of the Percheron horse-breeding studs. One of the stallions is by the celebrated sire Etudiant, now the property of Senator White, Virginia, who won the first prize at Paris, 1908, first at Nogent, 1908 and 1909, and first at Montagne in 1908. He is a strong, active horse with true action and good quality. The mares are sweet looking and not over large, four of them being in foal. The Clydesdales were purchased from the well-known firm of A. & W. Montgomery, Kirkcudbright. Both are two-year-olds, with straight action and not too much hair about their fetlocks. The Catalonian donkeys were selected in Spain around Vich, San Juan, Olot, and other centres. They are pure blooded with plenty of bone and size. The jacks are full of courage, and should prove a success at the stud. One jack, Voluntaire, is an animal of exceptional quality, and it is hoped to breed some good jacks by him at Grootfontein. Mr. Borthwick endeavoured to obtain another exceptionally fine jack, but although he offered £240 for him, his owner would not sell.

The Shorthorn cattle were purchased principally from the Maisey Hampton Herd, which has been in existence for over sixty years, and has been bred during the whole of that period with sound judgment and careful management. It was founded by Mr. Hobbs' father with large-framed, heavy-milking cows principally of Bates' blood, and has been kept up to the highest standard by the continual use of the best sires obtainable. Among these may be mentioned the famous Darlington bull Devonshire (47,686); Royal Nottingham (59,834), a son of that celebrated cow Molly Millicent; Mr. Hoskin's New Year's Gift (77,328), himself a Royal winner and a son of Countess of Oxford 14, champion at the Royal Show at York; Loyal Squire (83,982), bred by the Earl of Northbrook from the Broadhooks tribe; Near Go

(79,473), bred by Messrs. Garve, of Aldsworth; Lord Lovat's Beaufort Prince (87,933), full of the best Scotch blood; Sir A. Henderson's Buscot Pluto, a son of Wanderer's Prince Hampton Bowling (99,064), bred at Maisey Hampton, and sold for a large price for exportation after winning second prize at the Royal Show at Gloucester.

The bulls recently in use have also been of a high class, and include Buscot Mainsail (104,942), whose own brothers, Baron Buscot and Buscot Victor, were sold for £1135 and £1250 respectively; and Lord Thistle (99,474), by Lavender Royal out of the beautiful prize cow Lady Dorothy 39, bought by Lord Calthorpe at the Holme Pierrepont sale in 1907 for 250 guineas. It will thus be seen that the herd consists of a judicious blend of the fashionable Scotch and Bates' strains. Although showing has not been made a special feature,



Clydesdale Stallion.

animals have been occasionally exhibited with great success at the Royal, Oxfordshire, Gloucestershire, Tredeger, London Dairy, and other shows. Miss Concord 6 won second prize for Shorthorn dairy cow at the Wiltshire Show at Salisbury this year. The pedigrees are appended:—

Musical 150.—Granddam Musical 86.

Musical 86 won first prize in the milking trials at London Dairy Show, 1900.

Matchless 75.—Granddam Matchless 40, which was also the granddam of Matchless 69.

Matchless 69 won first prize as a heifer at the London Dairy Show, 1907.

Hampton Duke.—Sire Lord Thistle.

Lord Thistle, dam Lady Dorothy 39, a winner of many dairy prizes.

Musical 150 and *Lyford Rose* 15.—Sire Hampton Bowling.

Hampton Bowling won in 1908 first and Shorthorn Society's Prize of £10 at the Gloucestershire Show, third prize at Wiltshire Show, second prize at Royal Counties, in 1909 second prize at Oxfordshire Show, second prize at Royal Show, and was sold for £800 for export to South America.

It will thus be seen that sound foundation stock have been purchased for the Grootfontein Shorthorn Herd.

The Oxford Down sheep ewes were purchased from Messrs. G. Adams & Sons, Royal Prize Farm, Farringdon, Berkshire, and are an exceptionally good lot. The Berkshire boar, Crewe Prince II., is a grand specimen of the Berkshire breed, and in the hands of Mr. Allan, the Principal of the Elsenberg Agricultural College, no doubt will give an impetus to the breeding of that most suitable breed of pigs in the Cape Peninsula. In the selection of the cattle Mr. Borthwick received much help through the firm of Sir Richard Cooper, the services of the estate manager, W. Webb, being placed at his disposal.

The Mayers Alleged Preventive for Lamziekte.

POST-MORTEM REPORTS ON TEST CASES.

WITH reference to tests on the above preventive treatment reported in the August issue (page 158) the following further post-mortem reports are published for general information:—

POST-MORTEM REPORT NO. 39.

Black and white cow, condition good. Rigor present, slight tympany. Bloodstained discharge from nostrils. Tongue protruding.

On opening peritoneal cavity a dark straw-coloured fluid spouts through the incision.

Lungs: Partly collapsed. Both show strong diffuse hyperaemia on section.

Peritoneal cavity: Some straw-coloured fluid, about 150 c.c.

Pericardium: Diffuse extravasations (sub-epicardial).

Right ventricle: Blood coagulum. Extravasations and petechiae present under endocardium, slight imbibition of walls and septum. Strong imbibition of valves.

Left ventricle: Ditto.

Liver: Mottled appearance under capsule of left lobe, cutting hard on section, cirrhotic, slightly enlarged. Gall-bladder distended with dark green bile fluid.

Kidneys: Diffuse hyperaemia, Bowman's capsules distinct. Cortex streaky, reddish and greyish lines.

Spleen: Softer than normal on section, not enlarged.

Caecum: Mucous membrane covered with a thick yellowish adherent exudate, localized slaty discoloration, size of 3d.; a few haemorrhagic streaks.

Colon: Strong patchy hyperaemia of mucous membrane.

Ileum and jejunum: Distended with gas, local patches of strong hyperaemia, irregular in size, from 3d. to 1s. piece.

Abomasum: Strong patchy hyperaemia of mucous membrane, with slight diffuse hyperaemia. Mucous membrane thickened.

Omasum: Patchy hyperaemia of sub-mucosa, contents drier than normal.

Rumen and reticulum: Normal.

Brain: Sight injection of vessels of pia mater, cerebro-spinal fluid increased; brain soft, pulpy, and sodden.

Diagnosis: Lamziekte.

(Sgd.) D. T. MITCHELL.

POST-MORTEM REPORT No. 40.

Black and white cow, 3 years, condition fair, rigor present, discharge from mouth and nostrils, fifth rib of left side broken midway. Small local adhesion.

Lungs: Partly collapsed, strong diffuse hyperaemia on section. Trachae empty. Bronchiae and mediastinal glands normal. Epicardium, few petechiae and ecchymoses. Right ventricle normal. Left ventricle normal.

Liver: Mottled appearance on section, slightly swollen, gall-bladder distended with dark green bile.

Kidneys: Slight diffuse hyperaemia of both.

Spleen: Pulpa soft, organ slightly enlarged.

Jejunum and ileum: Catarrhal enteritis, contents yellow mucoid and viscid, mucous membrane strong patchy hyperaemia in transverse lines.

Caecum: Strong patchy hyperaemia of mucous membrane.

Colon: Ditto.

Abomasum: Slight patchy hyperaemia of folds of mucous membrane.

Omasum: Normal.

Reticulum: Contents ingesta and pieces of bone.

Rumen: Numerous amphistomes attached to mucous membrane.

Brain: Cerebro-spinal fluid increased, slight injection of vessels of pia mater.

Diagnosis: Lamziekte.

(Sgd.) D. T. MITCHELL.

POST-MORTEM REPORT No. 44.

Three-year-old cow. Condition good. Rigor present. Subcutaneous tissue of right side of body, bloodstained. Pericardium about 100 c.c. bloodstained fluid.

Lungs: Not collapsed. Both strong hyperaemia on section. Bronchial glands, strong hyperaemia. Epicardium, slight imbibition. few extravasations. Right ventricle, blood coagulum, slight imbibition. Left venticle, ditto.

Liver: Swollen, venous stasis. Bile normal. Gall-bladder distended.

Kidneys: Both show strong diffuse hyperaemia on section.

Spleen: Pulpa soft. Organ not increased in size.

Caecum: Gas bullas in sub-mucosa. Mucous membrane normal.

Ileum: Distended with gas, contents bloodstained, mucous membrane thickened and shows diffuse hyperaemia.

Jejunum: Mucous membrane thickened and shows few hyperaemia patches covered with catarrhal exudate.

Abomasum: Intense hyperaemia of folds of mucous membrane.

Reticulum and omasum: Normal.

Rumen: Few amphistoma conicum present, attached to mucous membrane.

Brain and cord: Cerebro-spinal fluid very much increased. Vessels of pia mater injected.

Diagnosis: Lamziekte.

(Sgd.) D. T. MITCHELL.

POST-MORTEM REPORT No. 45.

Black and white cow. Condition poor, lying on left side. Patches of yellow gelatinous infiltration and areas of subcutaneous and intermuscular extravasations on left side, principally over the shoulder and chest wall. Left axilla yellow gelatinous infiltration. Calf in uterus (4 months).

Lungs: Right not collapsed. Strong diffuse hyperaemia on section. Left lung partly collapsed, strong diffuse hyperaemia on section. Few small sub-epicardial petechiae. Right ventricle, blood coagulum. Endocardium, normal. Left ventricle, ditto.

Liver: Swollen, capsule tense, on section lobulation distinct. Bile, distending gall-bladder, dark green and fluid.

Spleen: Normal.

Kidneys: Left shows strong hypostasis. Right shows normal.

Caecum: Slight diffuse hyperaemia of mucous membrane.

Colon: Patchy hyperaemia of mucous membrane.

Jejunum and ileum: Contents dark red, bloodstained. Mucous membrane shows intense hyperaemia and much thickening.

Abomasum: Strong diffuse hyperaemia of mucous membrane.

Rumen: Reticulum and omasum, normal.

Brain: Cerebro-spinal fluid increased. Brain softer than normal. Vessels of the pia mater injected.

Diagnosis: Lamziekte.

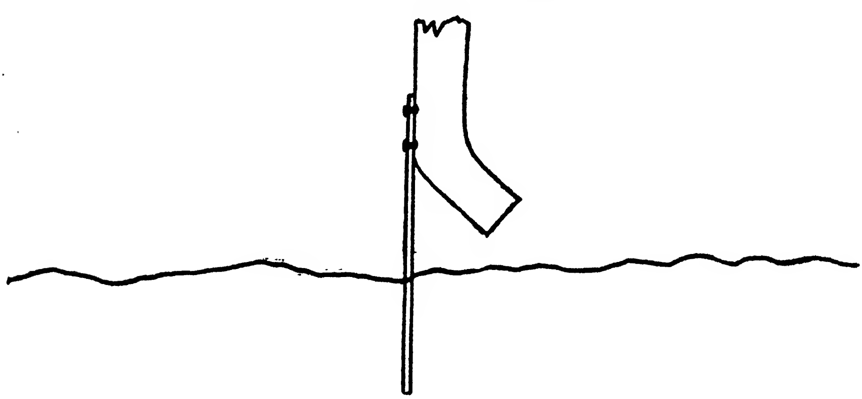
(Sgd.) D. T. MITCHELL.

Efficient Protection from Lightning.*

By R. T. A. Innes, F.R.S.E., Director of Meteorology.

Thunderstorms are probably as frequent and violent in the Transvaal as in any part of the world. In proportion to population, the deaths due to lightning stroke are much larger than in any other place for which statistics are available. But we must not let this alarm us. Even in the Transvaal the danger from lightning is quite insignificant, but, small as it is, it is worth guarding against. Then, to many people, a heavy lightning storm, with its accompanying deafening peals of thunder is an ordeal—the idea of sudden death terrifies the nerves—so that if people can be taught how to defy the lightning, to feel that, whatever happens, they are quite safe, something useful will be done.

The construction of the greater number of houses in the Transvaal is such that absolute protection from lightning is a simple and inexpensive process. This is because so many houses are built of sheet-iron, or at least have sheet-iron roofs. Where a house is built of sheet-iron all that has to be done is to see that the iron work is carried into the ground by two or three inches. If it is a wood-built house with an iron roof, the drain pipes from the roof to the ground should be joined by metal to the roof and be carried right into the ground. If the ground is wet or damp so much the better. A drain pipe at each of the four corners of the house is best, but two pipes at opposite corners are probably sufficient. If the discharge of the pipe is above ground, it will be necessary to attach strips of iron stretching from the pipe into the ground.



The theory involved is very simple. Iron, like all metals, is a good conductor, and if the iron about a house is all joined together, and to the ground to which the lightning has to get, the lightning will

* Reprinted by request from the *Transvaal Agricultural Journal*, Vol. VI, No. 21.

go by means of the iron and do no damage whatever. Now, suppose a disconnected iron roof—the lightning, after striking the roof, has no ready road to the ground, and, in its endeavours to find a road, may enter the house and do damage. Even so, the danger to life is small, as the lightning will almost certainly travel along the walls. If this principle is grasped, it will be apparent at once why a tent with a central pole is a particularly dangerous place in a lightning storm.

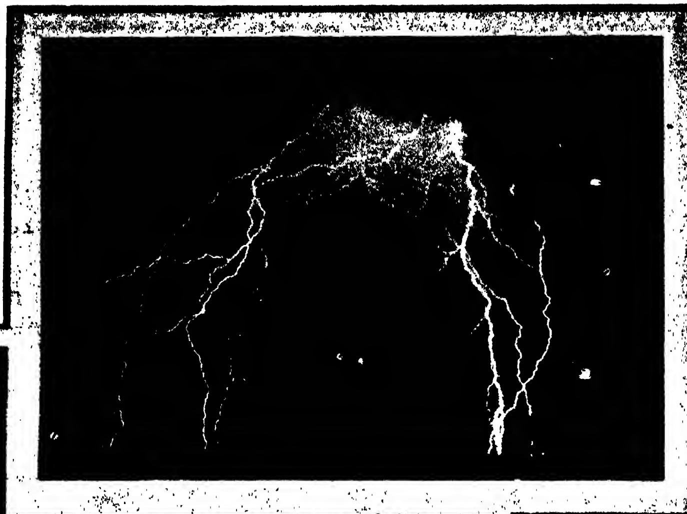
There is a slight analogy between lightning and rainfall. If the roof is intact, and there are sufficient gutters and pipes to take the rainfall to the ground, the house will not get wet, and vice versa, but lightning will not come through a hole in the roof like rain. What has been said about iron houses applies to all houses once their outsides have been thoroughly wetted by the rain which, fortunately, generally accompanies a thunderstorm. An unbroken, wet surface acts like a good conductor. A slate or tiled roof may be wet, but discontinuously wet—if so, lightning stroke may do damage. The most dangerous lightning strokes are those of dry storms when the lightning, striking a non-conductor such as dry wood, has, as it were,

to force its way to the ground. But an iron house, properly connected to the ground, is safe at all times. It is best to be indoors during a lightning storm. It is not advisable to take refuge under an umbrella or tree or to be riding a bicycle at such times.

But let us suppose the worst happens and that someone is struck and rendered insensible by lightning. The first thing to remember is that the person is not dead but unconscious. If the body is badly burned (a very rare occurrence, be it noted) perhaps resuscitation of life will not be successful. Anyhow, strip the body at once and apply the movements used for drowned persons so as to get the heart and lungs to resume their functions. One of the weekly electrical journals publishes a sheet giving the full directions to be followed in case of apparent death due to the passage of a heavy electrical current through the body. When it is considered how very cheap these sheets are, it becomes a question if one should not be hung on the walls of every schoolroom in the Transvaal and explained once a year to the school children. In building shelters for live stock, if these are roofed with

Lightning Discharge.

Fig. 1.



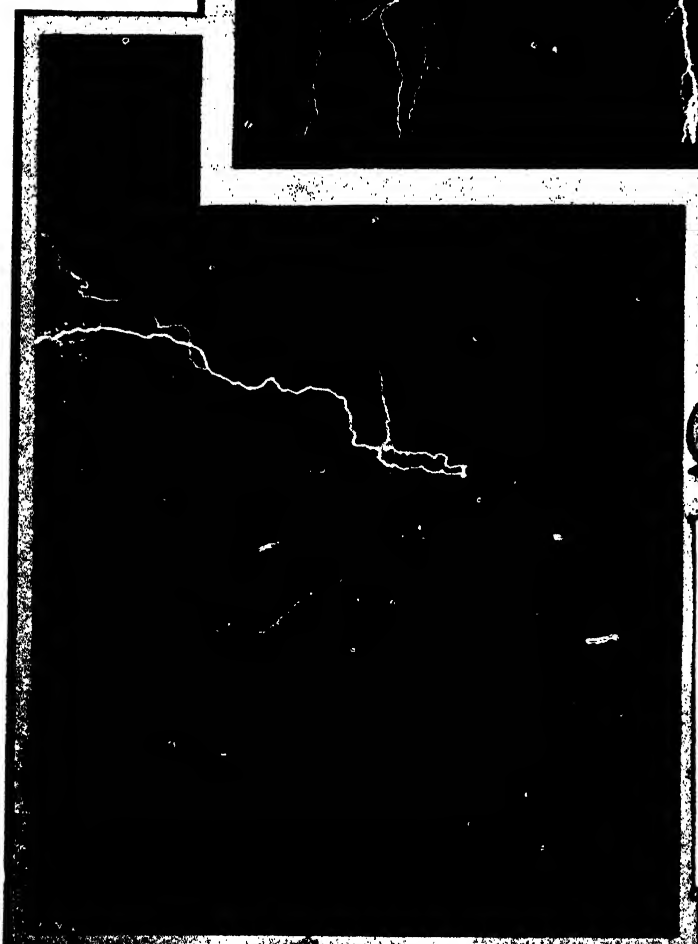


Fig. 2.

Photographed at Vereeniging by T. N. Leslie, F.R.Met.Soc.

sheet-iron supported and connected with iron posts, they are certainly durable, and cattle under them cannot be injured by lightning.

So much for practice, but the reader may wish to know something of the theory on which the practice is founded. It was Benjamin Franklin, who, in 1749, proved that lightning was due to the passage of an electric spark, certainly a very large one, from the thundercloud to the ground. Franklin and others drew sparks from the clouds by means of wires attached to kites; this, joined to the knowledge that an electric current passes easily through a metallic conductor (such as a wire), gave rise to the theory and use of lightning conductors. It has been recognized for some twenty years or so past that the protection given by a lightning conductor is only partial; in fact, a lightning conductor does not really fulfil the function of conducting the lightning to the ground at all as was first supposed. The protection it gives is due to another property of the conductor altogether. Before a lightning flash passes from the cloud to the ground, we may imagine that there is an accumulation of electricity (be that what it may) in the cloud, and a lack of it where it will strike the ground and the balance, as it were, will soon be restored by the disruptive discharge called a lightning flash. A conductor making a good contact with the ground and ending in a fine point overhead acts as a safety valve does, and allows a slow escape of the electricity to take place, so that the chances that a discharge will take place directly in the neighbourhood of a conductor are greatly lessened. The Transvaal Observatory is built on an exposed position but is well protected by conductors, and it does not appear to have been struck yet, but during the passage of thunderclouds overhead, the conductors are hard at work relieving the tension; standing below them one can hear the crackling and spitting of the sparks as they leave the conductors and so relieve the tension.

The so-called lightning flash is not often a single spark but a great crowd of sparks travelling over a wide path to the ground. This is well shown by the reproduction of Mr. Leslie's photograph. (Fig. 1.)

The magnitude of such a discharge as this one is proves the futility of a conductor should such a discharge happen to fall on a building. In fact, the number of buildings supplied with conductors which are damaged by lightning have proved that conductors do not give absolute protection. A certain quantity of the discharge will generally follow the conductor, but the building may be struck elsewhere at the same time.

Faraday proved long ago that if he placed himself in a metallic cage it was impossible to give him an electric shock; that is to say, it was evident the electricity could not enter the cage. The Lightning Research Committee had this experiment of Faraday's in mind, no doubt, when it penned the following words:—

> *Absolute protection of the whole of a building could only be ensured by enclosing the structure in a system of wirework —a contrivance, in fact, of the nature of a bird-cage. This should be well connected at various points to earth, etc.*

It will be seen now why all-iron buildings, so common in the Transvaal, are lightning-proof, and how easy it is to ensure that iron-roofed houses may be made practically safe.

* A very large number of severe thunderstorms have occurred in the United Kingdom during the present year, and, in numerous cases, death or severe injury has resulted from lightning shock.

Whether the increase in the number of casualties due to lightning is caused by an increase in the severity of the thunderstorms in this country, or is the result of carelessness on the part of those who have suffered, it is impossible to say without a full study of the statistics bearing on the subject; but anyone who has listened to the discussion by the general public of the risks due to lightning, and of the best means of avoiding them will know that even well-educated people are distressingly ignorant on this matter. There is, consequently, some ground for the belief that were the scientific principles which are illustrated upon a large scale by Nature in thunderstorms more fully understood, the obvious and imperative precautions would be more widely obeyed, and the list of fatalities would be correspondingly reduced. In this article the writer has brought together a few suggestions for the guidance of those who may be overtaken by thunderstorms when in the open country, and has explained in simple language the scientific principles upon which these are based. If all who read these suggestions will study them carefully, and, above all, discuss them with their friends, some progress will have been made in combating the general ignorance upon this highly important subject.

I.—When overtaken by a storm in open, flat country, it is best to lie down in a ploughed furrow or in any slight hollow or depression until the greatest danger is passed—choosing the dryest furrow, and taking care that you are some distance from standing or running water, and from large farming implements containing masses of steel or iron.

This rule is based upon the well-established scientific fact that any upright body or excrescence upon a perfectly flat surface acts as a point for the electric brush or silent discharge, and that when this silent discharge is too slow to relieve the great difference of potential between the earth and the overhanging cloud, the disruptive or "flash" discharge occurs. By lying down, when the thunder cloud is passing directly overhead, you make yourself part of the flat earth, and the risk of acting as the discharge point is enormously reduced. The avoidance of masses of water or of metal is necessary, since these are better conductors of electricity than earth, and the disruptive discharge or lightning stroke is more likely to occur in the vicinity of such masses than at a distance from them. For this reason cyclists should dismount from their machines and lay them down some distance from the point where they themselves are stationed. Golfers should follow the same plan with regard to the disposal of their golf clubs, though in this case the added danger due to the metal is much less, and is, perhaps, negligible.

II.—When overtaken by a severe thunderstorm in the vicinity of a wood, the trees of this may be used for shelter if certain precautions are observed.

* To Mr. Innes' timely remarks we append the following report on "Lightning, its danger to human life, and how to avoid it," taken from a recent number of the Edinburgh *Scotsman*.—[EDITOR, *Transvaal Agricultural Journal*.]

Tall trees projecting far above their companions should be avoided, especially pines; and, whatever tree be selected for shelter, it is wise to stand upon the windward side of a tree at a distance of at least six yards from the trunk. The chances of the smaller trees in the wood being struck by lightning are practically infinitesimal, and if shelter be taken at the distance named on the windward side under a tree which is struck, the person sheltering would only suffer a slight shock. Lightning fatalities in woods are extremely rare, and when they happen they are due to the slight distance separating the person from the tree trunk down which the lightning descends. Single trees or clumps of trees situated in flat, open country are much more dangerous for the reasons already given, and if shelter is sought near these, at least ten yards should separate the shelterer from the tree trunk. It is wiser, however, to give such trees or clumps of trees a wide berth when a thunder cloud is passing overhead, or, in other words, to seek open country and to lie down.

III.—Outhouses and brick buildings may be used for shelter when the precautions noted in Rule II. are followed. The lowest portions of the building should be selected, and the fireplaces be avoided; while on no account must a position be taken up between a fireplace and an open window or door, or between two open windows or doors of the building.

The lightning flash, if the building be struck, will probably follow the air currents and pass out of the house by window or door. To stand in the line of these air currents is, therefore, to court destruction.

These three suggestions cover the whole of the risks from lightning when the storm is met with in open country. If generally obeyed, the casualties from this cause would be greatly reduced in number.

As regards the precautions to be observed when one is under the shelter of one's own roof, the remarks as regards air current under III. apply here.

All windows and doors in the house should be closed while the storm lasts, and shelter should be taken out of the direct line between the fireplace and door or window of the basement rooms of the house. If the house be in an isolated district, and unprotected by taller houses or buildings in the vicinity, a lightning conductor fixed by a competent man is, however, essential to the security of the house and its inhabitants. Lightning conductors designed and erected by incompetent persons are, however, an added source of danger.

Finally, it may be stated that three kinds of lightning are known —sheet, forked, and globular.

The first of these is simply the reflection of lightning flashes at a great distance (often below the horizon), and is not dangerous to life.

Forked lightning is that caused by the actual disruptive electric discharge near at hand. The path of the flash in this case is nearly always zig-zag. This is the dangerous kind of lightning, and when the flash and the thunder follow one another closely, it is time to take the precautions named in the earlier part of this article.

As regards globular lightning little is known, since it is of comparatively rare occurrence. Well authenticated instances of its

appearance, however, prove that it is not an optical delusion as some believe. The electrical discharge in this case takes the form of a ball of fire, moving slowly or quickly over the surface of the ground. It usually disappears with a loud report. Globular lightning is, of course, dangerous to life, but the fatalities caused by it, on account of its rare occurrence, are not numerous.

Some Poultry Diseases.

By R. Bourlay, Poultry Expert (Transvaal).

(*Continued from page 345.*)

Diarrhœa is a fairly common complaint in South Africa, especially during the warm weather, it is due to many and various causes of which sour food, sun-warmed or bad water, sudden chills, or the presence of irritant matter in the stomach are a few.

After removing the patient to a quiet warm place give a dose of epsom salts, which should be followed in two hours' time by a dessertspoonful of sweet oil, the former will remove any irritant matter whilst the latter will soothe the stomach and tend to allay any inflammation. One grain doses of opium or 5 drops of chlorodyne have frequently been recommended and are undoubtedly useful when available, also 5 grains of rhubarb and 10 grains of carbonate of soda, but these remedies are not always procurable, for it is not every farmer who has a chemist shop round the corner—and to such I would recommend the use of the aloe leaf. The variety of aloe referred to is usually found growing on the stony parts of the veld or on kopjes, the leaves are of a dark green colour with whitish spots, thick and fleshy and the edges have sharp thorny spikes.

A few of these bruised and placed in the drinking water are sufficient in mild cases of diarrhœa, but in more advanced cases it is better to peel the leaf and remove the fleshy pulp from the inside, which should be mixed with flour and made into large pills, two of these given night and morning have cured the worst cases of diarrhœa that I have seen within thirty-six hours.

Diphtheritic Roup or Diphtheria is fortunately not so common in South Africa as in Europe; isolated cases do occur at intervals, but this scourge does not seem to spread in the same rapid manner through a whole flock of birds as in England, where it is no uncommon thing to find a whole farm tainted with this disease. Probably the hard dry soil and continual sunshine assist to a great extent in preventing the spread of the disease in South Africa.

A fowl which is badly affected with eye roup will frequently show signs of diphtheria, but a genuine outbreak of diphtheria cannot be mistaken. In its early stages small cream coloured spots appear on the inside of the mouth or in the throat, and directly this is noticed the bird must be immediately isolated; it is also wise when diphtheria makes its appearance amongst a flock of birds to carefully examine every fowl in the pen in which the outbreak has occurred, for at its commencement this disease gives no external indication in the condition of the fowl.

The house and run should be thoroughly disinfected, all drinking vessels scalded with boiling water, and as a precautionary

measure permanganate of potash should be added to the drinking water.

If neglected diphtheria developes very rapidly; when the throat is affected the bird will probably die from suffocation, whilst we have also seen cases where the mouth was so full of the growth that the fowl could not close its beak. Unless the birds which have contracted this disease are of considerable value it is, in our opinion, the wisest course to kill them at once and burn the bodies, for even under the most favourable conditions the cure is a long and tedious process, and even when it is cured it is not wise to use the birds for breeding purposes. When it is decided to attempt a cure, the mouth should be opened, and with the aid of a small piece of pointed wood the canker or lumps of cheesy matter should be removed, these will come away fairly easily, leaving a raw place which may be touched with caustic, or painted with a 1 to 40 solution of carbolic acid, but as both of these have a burning effect it is wise to withhold water for a couple of hours after treatment or the bird is liable to drink too much.

Feed on soft food and give a little cooked meat, also a dose of epsom salts; care should be taken to burn any pieces of canker which have been removed and also the wood which was used in their removal.

"Dubbing." Removal of Comb and Wattles.—This is not a disease and really has no place in this article, but as we have found that this operation has had a very beneficial effect on breeding stock, especially in the cases of male birds of the lighter varieties, we venture to include a few remarks on the subject.

It will have been frequently noticed that the combs and wattles of many of the lighter breeds, such as Leghorns, Minorcas, Anconas, etc., frequently grow to an abnormal size, this may be due to a variety of causes, of which climate, the craze for increased size, overhot houses, and excessive animal food are some. It has been our experience that roosters bearing these exaggerated appendages seldom prove to be of much use as stock birds, for after having been mated for a few weeks they seem to loose condition, the result of which is shown by a high percentage of unfertile eggs; if, however, these same birds are taken out of the breeding pens and dubbed they will in three weeks, when the wounds have healed, be ready to go with the hens again and no further trouble will be experienced, for they appear to keep in much better condition and there is seldom any reason to complain on the score of infertility.

When removing the comb we prefer to use a sharp small-bladed knife, an assistant must hold the bird, the two legs being grasped in one hand and the two wings in the other; the operator then takes a firm hold of the comb and cuts from the base forward to the beak, the cut being made as close to the head as possible; directly the comb is off pour cold water over the head, but if this does not stop the bleeding (and frequently it does not, for the vein is severed when cutting off the comb), it can either be seared with a hot iron or a liberal quantity of boracic acid powder may be applied, which should be pressed firmly on to the exposed vein.

Some poultry fanciers, so soon as they have dubbed the bird, throw it up into the air which sometimes has the effect of checking the flow of blood.

In removing the wattles we prefer to use a pair of curved surgical scissors, but as no veins are cut in this part of the operation it is only necessary to wash and sprinkle the wound with boracic acid powder. The bird should be placed in a quiet place and the scabs which form on the wounds will fall off much more quickly if they are rubbed over with vaseline every other day. The patient must not be returned to the breeding pen until the wounds have quite healed or the hens will be liable to peck them.

It may be argued that this is a painful operation and consequently cruel, but as the whole thing is over in less than five minutes, and we have frequently seen birds attempting to fight immediately after the operation, we cannot think that it can be such a painful proceeding as might be imagined, and, further, as we are convinced that the lives of many birds have been saved by this process we consider that it is justifiable.

Egg-eating is rather a common vice in many poultry yards, frequently it is contracted when birds are travelling owing to an egg which has been laid in the coop being broken; it is also caused by a fowl dropping a soft shelled egg in the run when it will probably get broken and eaten.

Directly it is noticed that a fowl has contracted this habit it should be immediately isolated, for if not it will very soon contaminate the remainder of the flock. Various cures have been suggested, one being to use a nest so constructed that the eggs will roll out of sight of the birds so soon as they are laid.

Another is to feed the fowls on broken egg shells for a few days, which is said to make them so tired of the egg shell diet that they do not want any more.

Another suggestion is that an egg should be filled with mustard, pepper, etc., and placed in the run for consumption, but our experience of this method is that the fowls detect the presence of the trap and carefully leave these doctored eggs alone. We consider that the plan of feeding on egg shells (provided that the supply is adequate) is the most practical and it is certainly the most easily applied.

Egg-bound.—This term is used in cases where a hen is unable to pass an egg owing either to the presence of an abnormally large egg or to over fatness. First steam the vent by holding the part over a basin of boiling water; this will sometimes have the desired effect, but if not, a dessertspoonful of salad oil should be injected and the bird placed in a quiet coop when she will probably succeed in passing the egg; but if in an hour's time the egg has not come away further steaming and injection must be resorted to. Great care must be exercised to prevent the egg being broken in the duct. for should this happen the case immediately becomes more difficult and dangerous, for unless the broken shell is expelled inflammation will set in. In some instances the hen will succeed in passing the broken shell, but when she is unable to do this, the finger, well oiled, may be gently inserted, and if the shell is within reach it should be carefully withdrawn; if, however, it is too far up to be extracted by the finger the only remaining chance is to syringe well with salad oil which will facilitate its passage and the hen herself must do the rest. In this as also in cases of egg-bound the patient should be kept quiet for a week or so and fed on non-stimulating food.

Eggs Soft Shelled.—It is commonly supposed by many that this is entirely due to lack of lime for the formation of the egg shell, and in a certain instance this is undoubtedly the case, but in the majority of cases where shell-less or "wind eggs" are laid it will be found that the hens are too fat; this applies especially to South Africa where it is very seldom that one finds a healthy hen in poor condition, but usually very much the reverse.

The obvious remedy in such cases is to reduce the condition of the birds, when it will generally be found that the production of soft-shelled eggs will cease.

Enteritis.—This is unfortunately a very common disease in South Africa and is responsible for an enormous number of deaths in the poultry world every year. The symptoms are usually indicated by moping and listlessness on the part of the bird which stands or crouches with ruffled feathers, which indications are accompanied by violent purging, the evacuations usually being of a very loose liquid nature in which white, green, and yellow are clearly discernible. When blood appears in the evacuations it is a serious sign, indicating internal haemorrhage and generally foreshadows a fatal termination.

Enteritis, though a common complaint in South Africa, should be of rare occurrence, for it is invariably due to preventable causes, such as bad water, decayed vegetable matter, bad meat, sour food, or the presence of some irritant, such as unslaked lime, and the first thing to be done is to remove the cause, which would never have been there had the birds been properly attended to.

Keep the patient in a warm dry place and administer a dose of salad oil, which should be followed by warm milk. Strong purgatives, such as epsom salts and castor oil, are useless in such cases, as their action is too violent and will probably prove fatal.

As a sedative two or three drops of chlorodyne in warm milk may be given, and all hard food, i.e. grain, also grit must be withheld and the bird fed on soft food only.

Feather Eating.—The cause of this habit is frequently due to birds which are kept in confined runs having nothing to do, i.e. idleness; and the obvious remedy in such cases is to provide some occupation which can be done by placing a heap of horse manure in the yard for the birds to scratch in; all grain should be buried in the manure, and the process of finding this will keep the fowls well occupied so that they will not have idle hours to spend in which to contract this habit.

In certain instances it is, however, due to a small mite known as the "Depluming Scabie", which causes such irritation at the base of the feathers that the birds will frequently pluck out their own feathers with the probable object of allaying the irritation.

Perhaps the quickest and most effectual method of combating this insect is to dip the fowls in a 2 per cent. solution of tobacco extract, for this not only destroys the scabie but will also rid the fowl of lice, etc.

Fleas.—There are very few poultry-keepers in South Africa who are not worried at one time or another by the presence of chicken fleas, these generally make their appearance in force during the middle and later part of the summer, and it is no uncommon thing to see fowls with clusters of these pests adhering to the head, but it

is in the case of late hatched young stock that the chicken flea is the greatest source of danger.

A great deal can be done to combat this pest by cleanliness and thorough spraying with liquid disinfectant, but there are certain places where it is extremely difficult to keep fleas down, especially where the soil is of a light sandy nature.

We have also found that corrugated iron houses are especially liable to be infested with them, hence our objection to the use of this material for the housing of poultry.

When fleas have already attached themselves to hens or chickens in the way indicated above we have found that the simplest remedy is to smear some grease or oil or anything of a sticky or oily nature, such as sweet oil, on the heads of the affected birds, this will effectually suffocate the insects.

Directly it is noticed that the birds using any particular house are being troubled by fleas it (the house) should, if possible, be moved into fresh ground after having been thoroughly cleaned and sprayed, but care must be taken to see that the work is thoroughly done and that no cracks or corners are overlooked.

Frostbite is not an uncommon occurrence in many parts of South Africa, especially in the higher altitudes, and especially if poultry are too much exposed during winter or are in bad health, birds of the lighter varieties, i.e. those having large single combs are naturally more subject to this than are the heavier breeds which do not carry such heavy appendages.

In the early stages frost-bitten combs or wattles will be dark blue or purple in appearance, but later the frozen parts will have a dead appearance. This is another instance where dubbing is of value, for a dubbed bird will never get frost bitten, and in bad cases of frost bite it is the wisest plan to remove the affected part at once.

Gapes in chickens is fortunately a trouble which is not general in South Africa, at any rate not so far as the inland Provinces are concerned, for the conditions are not favourable to the development of the gape worm, but isolated outbreaks do occasionally occur, especially where the chickens are running on moist ground.

The symptoms are indicated by the chickens gasping with the mouth wide open, sneezing and coughing; these are caused by the presence of the gape worm in the windpipe, and in coughing some of the worms or their eggs are frequently ejected and are picked up by the other chickens thus spreading the disease.

There are several cures for this complaint, but the most effective is, we consider, that of fumigation; place the chick in a covered box into which a receptacle containing some live coals is put and a little carbolic acid poured over these, the chicks will breathe the fumes of the carbolic acid, and in doing so the worms are killed. It is necessary to watch the chickens carefully during the process or they will be killed also. Usually two or three minutes is quite sufficient to affect a cure, and directly the chicks are seen to stagger they must be removed. When an outbreak of gapes has occurred the ground should be cleared of all stock, well limed, and ploughed or dug over and not used again for poultry for several months. All drinking vessels, etc., should be thoroughly scalded in order to prevent any possible spread of contagion.

Going Light is a term which, in poultry parlance, is applied when birds are found to be wasting away, and is due to one of two causes, either consumption or tuberculosis. It is frequently met with in South Africa, for though consumption is not very common amongst poultry in this country we are sorry to say that tuberculosis is. In appearance the bird appears to be out of condition and mopish, and when handled it is found to be practically nothing but skin, bone. and feathers, whilst the breast-bone is sharp and devoid of flesh.

We know of no cure for this scourge, and would advise that all birds so affected should be immediately killed and their bodies burnt.

Certain precautions can, however, be taken to prevent this disease, such as breeding only from sound healthy stock, absolute cleanliness and ample fresh air in the houses.

(*To be continued.*)

Union Dry-Farming Congress.

The Union Dry-Farming Congress was held at Pretoria on the 18th and 19th October. The Right Honourable the Prime Minister and Minister of Agriculture (General Louis Botha) formally opened the proceedings, and there were nearly 400 delegates present from all parts of South Africa. Among those present were General Lord Methuen, the Minister of Lands (Hon. A. Fischer), Mr. J. A. Neser, M.L.A. (President), the Acting Secretary for Agriculture (Mr. F. B. Smith), the Minister of Posts and Telegraphs (Sir David Graaff), the Minister for Education (Mr. F. S. Malan), the Mayor of Pretoria (Sir J. G. van Boeschoten), Mr. Lionel Phillips, M.L.A., and Sir T. Cullinan, M.L.A.

On the assembling of the congress, the Mayor (Sir J. G. van Boeschoten) accorded the president and delegates a hearty welcome to Pretoria, more particularly because he saw many faces from the other Provinces of South Africa. On the programme he saw the momentous words, "The destiny of South Africa is on the dry lands", and by their presence that day he hoped they showed they believed in that quotation and were going to do their best to prove it. There had been great progress in agriculture in South Africa during the past few years, and for that they had very largely to thank a sympathetic Government and more particularly their Prime Minister in his capacity of Minister of Agriculture. The speaker referred to the enormous benefit which the country had reaped from the establishment of the Land Bank by the Government, and said that in assisting agriculture the citizens of Pretoria had not been behindhand. They had given a considerable extent of land to the Government for the purpose of establishing a National Agriculture College. (Applause.) He asked them to assist the people of Pretoria in that matter, and to see that ground used for the purpose for which it had been given, and see an agricultural college placed upon it at the earliest possible moment. (Applause.)

General Botha's Speech.

The Prime Minister (General Louis Botha) said he had great pleasure in opening that, the second Dry-lands Congress, and he was very grateful to see such interest taken in the subject by such a representative gathering. There was practically no corner of South Africa which was not represented in that room, and nothing could give him greater pleasure than that. To a man who had always worked for and defended the Union of South Africa, this was very encouraging, because it showed that the country was ripe for union. (Applause.) He was particularly glad to see in the presidential chair his old friend, Mr. Neser, for no more energetic man, or one more prepared to sacrifice himself for dry-land farming, could be found in the country. (Applause.) He was glad also to see present the Mayor of Pretoria (Sir Johannes van Boeschoten) because they

all knew of the work which he had done in encouraging dry-land farming and agriculture in general, especially from the point of view of education. He wished these two old friends much success in their work, and hoped they would hold the leading-reins tight. (Applause).

The principles of dry-land farming were excellent, because they meant the more thorough working of their land, deep and proper ploughing, keeping the soil loose so that unnecessary evaporation was prevented, and by which the moisture which would otherwise rise and evaporate was retained in the soil. Anybody who knew anything of dry-land agriculture, and had made a study of it, knew that it was a method of cultivation which could be recommended in connection with any kind of farming in South Africa. It always afforded him the greatest pleasure in travelling through the country to see the increase in agriculture, and its development in all parts, and he was particularly glad to notice that farming was now being conducted along more scientific lines. (Applause.) He considered that the scientific preaching of their dry-farming enthusiasts had a great deal to do with that. (Applause.) He hoped that the dry-farming methods would be adopted on every farm all over the country.

But while submitting the methods of dry-land farming, he wished to add that they must not allow their enthusiasm for it to run away with them so as to overlook the other methods of farming. (Applause.) There was no doubt that dry-land farming was one of the best possible things where there was no water, but where they possessed farms with water, or where they could conserve water in dams, they must not abandon their irrigation methods for dry-farming. (Applause.) The possession of water was of the utmost importance in farming, and he thought the Union Government would be only doing its duty if it were to spend millions of pounds in the work of the conservation of water. (Loud applause.) Dry-land farming in this country must go hand-in-hand with farming by irrigation. One of the gravest dangers he saw in the future was the process of farming by which the natural fertility of the soil was exhausted by the farmer without being replaced. They were very anxious to plough and get their crops, but were not so anxious to replace in the soil what they took out of it, and he did not exclude himself in this respect. They often ploughed the same piece of ground year after year until they found the land would no longer give the proper crop. He thought they did not keep up the proper fertility of the soil to-day, and that would be one of their principal problems in agriculture in the future.

That was one of the secrets of successful farming. In America stretches of land in some parts had been rendered sterile by overworking them without proper nurture—those farms were cropped to death. To continually sow and to reap without replacing anything in the soil was very much like the man who had a large sum of money in the bank and was continually drawing cheques against it without paying anything in again. That man's end must be an overdraft. (Laughter and applause.) Continually reaping without manuring might make the parent, but it would certainly ruin the son. (Applause.) He therefore hoped South African farmers as well as the Government would give their most serious consideration

to this problem. A great number of farmers were already doing a great deal of good work in this direction, but he hoped the question would receive the serious consideration of all, and that also they would have in the future more of agricultural education and agricultural colleges. (Applause.) The Government had already reduced the price of guano, and the rate for fertilizers on the railways, and he recommended every one to take advantage of these facilities. But they must not forget the very great value of their own kraal manure, because sometimes artificial fertilizers turned out a disappointment. (Applause.)

The gold industry was a very great and valuable industry in South Africa, but compared with the production of maize in America they found that that country produced £340,000,000 in maize as against £30,000,000 of our gold industry. When they saw how well mealies grew in this country they must come to the conclusion that they had a very valuable gold mine in mealies. (Applause.) Agriculture was the parent industry as well as the backbone industry of the country, and he gave them the assurance that whenever his Government could support and assist agriculture along reasonable and fair lines, it would always be prepared to do so. (Applause.) It was quite certain that agricultural education had been very seriously neglected in South Africa, and if there was one thing that they could take up seriously, it was agricultural education. (Applause.)

If they went to the Agricultural Department to-day all over the Union they would find that their experts were men who did not come from South Africa. That showed that where they wanted scientific education it was necessary for them to go outside the Union. South Africa in this respect, as in others, had come of age, and they should now take up very seriously the question of agricultural education. He therefore wished to make an appeal to them. He noticed parents who were well off in South Africa and able to give their children a sound education were also very anxious for their sons to become ministers, or lawyers, or doctors. They were overstocked with members of these professions, and some of these, instead of carrying on their own professions, came to him for billets. (Laughter and applause.) He did not wish to say anything against those professions, but he thought it would be well for South Africa if those parents selected their most talented and energetic sons and sent them to study agriculture. (Applause.) If it were true that agriculture was the backbone industry, then the cleverest and most energetic boys should be sent to study it. Along scientific lines was their only possible way towards a good future, and he asked every one to put his hand in his own pocket to assist agricultural education. (Applause.) There was room for more agricultural education than anything else in South Africa, and it would be a great thing for them when they could show that their scientific instruction was given to them by sons of South Africa. (Applause.)

But they were afraid to spend the value of one Dreadnought on agricultural education. If they spent in South Africa the worth of one Dreadnought on agricultural, they would be astounded at the results. If they went through the statistics of imports of South Africa, they would find that millions of pounds worth of produce were imported into this country—produce that they were able to

raise themselves within the country. (Applause.) Let South Africa awake, and let their enthusiasm, energy, and ambition lead them to produce themselves that which they imported from other countries to-day. (Applause.)

They heard very often the cry from the mines and from the farmer, "Give us labourers!" He asked them if it was thought the Government had a machine which could produce labourers. (Laughter and applause.) The Government would do its best by legislation to improve the conditions of labour for the country; but he would like to ask them a question on the subject. What did the farmers in Europe do, in reference to the question of labour? When they went to a farm in Europe did they see any black labourer working on that farm? Did they see in the coal mines of England any Chinese or Kaffirs working on those mines? The solution of the labour problem was not for the Government, but for themselves. (Applause.) The solution of the whole problem was white labour. All over the world they showed that by white labour agriculture could be carried on. The solution was white labour, and they would have to inquire into it and see what kind of white labour was necessary to be brought into this country for the purpose. They should not always rely on the muscles and sinews of the black man in South Africa. If they wished to solve this problem, they must do so along the lines of white labour. They could abuse the Government, they could abuse Parliament as much as they liked, but for the mines as well as for agriculture there was only one solution of the labour question, and that was white labour. (Applause.)

Another thing which he enthusiastically welcomed so far as South Africa was concerned was the export of mealies. But they must also ask themselves if they could not do better still in this matter. Was it not better for them to use their own mealies through their cattle and produce so that they could send all kinds of produce to the markets of the world, and establish their own industries. (Applause.) It was the desire of every one of them, he thought, to establish industries in South Africa, and to this they must give deep consideration. (Applause.) The speaker again expressed his thanks to the meeting for their attendance in the interests of co-operation, and resumed his seat amid cheers.

THE PRESIDENT'S ADDRESS.

The President (Mr. J. A. Neser, M.L.A.), in the course of his address, referred to the fact that at the last congress he had given a survey of the rise and progress of dry-farming in America. On this occasion he would briefly sketch the progress of dry-farming in our sister Dominion—Australia. Mr. Neser then dealt at some length with the proceedings of the Commonwealth Dry-farming Conference held this year.

Proceeding, Mr. Neser said:—Finally, I look with confidence to the science of meteorology to help us to solve many of our climatic mysteries. At a recent Dry-farming Conference, held in Sydney, some truly remarkable results relating to the periodicity of drought were laid before the delegates. It would appear that a distinguished scientist, the late Mr. H. C. Russell, in a paper read before the

Royal Society of Australia, stated "that his investigations had convinced him, during a period of nineteen years, of the generally even character of the weather returns. He did not mean to say that there will be the same wet or the same amount of dry weather in every year of a series, but that the general character of the years in each series will be the same." Mr. Russell held that the nineteen years' cycle was a world cycle, and that all the great droughts of Australia had their counterparts in India; and that the levels of the great lakes in Palestine, South America, and New South Wales are subject to the same mysterious influence that controls the weather in the Commonwealth.

Mr. Russell has been followed by another Australian meteorologist, Mr. Keele, who has made further researches. Through the courtesy of the Director-General of Egyptian Surveys, Mr. Keele has been able to prepare a series of curves showing the rise and fall of the Nile. He carefully compared them with his Australian rainfall curves and found that drought on the Nile meant a drought in New South Wales. That when the Nile curve rose so did the rainfall curve of Adelaide in South Australia. He found that the Nile's period of seasonal change was 171 years. He writes: "The Nile is now in the first portion of its period. It has gone through the drought and is commencing a succession of magnificent seasons. The curve is built up of three periods of fifty-seven years, which are each composed of three periods of nineteen years." You will note, moreover, that 171 years is a multiple of 19. It is $19 \times 3 \times 3$. Therefore Keele's results bore out Russell's conclusions. Now, taking the fifty-seven year period, let us listen to what Keele says:—"The Adelaide curve is the most remarkable of all. The fearful drought of 1845 is repeated in 1902." And he goes on to boldly prophesy what will happen in Australia during the next few years.

PAPERS READ.

The following papers were read during the course of the congress:—"The Dry Lands of the World", by Mr. R. T. A. Innes, F.R.A.S., Director of the Transvaal Government Observatory: "Lessons from Lichtenburg", by Mr. H. S. du Toit, Superintendent, Government Dry-land Station, Lichtenburg; "Farm Life and Household Science in Canada" (illustrated lecture), by Miss J. C. van Duyn, Division of Household Science, Department of Agriculture; "The Maize Industry", (1) by Mr. Jos. Burtt-Davy, F.L.S., Government Botanist, (2) by Sir Thomas Price, K.C.M.G., member, South African Railways Board; "Dry-farming and Closer Settlement" (1) by Senator Byron, (2) by Mr. S. J. Hyde, (3) by Mr. T. Kleinenberg, M.P.C.; "Pastures for the Dry-farm", by Mr. E. W. Hunt, M.P.C.; "Dairying on the Dry-farm", by Mr. E. J. Macmillan, Acting Under-Secretary for Agriculture, Orange Free State; "Rainfall and Evaporation", by Father E. Goetz, F.R.A.S., Director of the Government Observatory, Rhodesia; "Cotton and Tobacco on the Dry-farm", (1) by Mr. W. Scherffius, Chief of the Division of Tobacco and Cotton, Department of Agriculture, (2) by Captain Elphick; "Progress of Boring on the Dry-farm", (1) by Mr. G. Ireland, Boring Engineer, Irrigation Department, (2) by Mr. A. J. Bester; "Fruit-growing

on the Dry-farm", by Mr. A. E. Bester, Acting Government Horticulturist; "The Wheat Problem", by Dr. Wm. Macdonald, Dry-land Agronomist; "Dry-farming and Steam Cultivation" (illustrated lecture). by Dr. Guradze, Agricultural Attache, Imperial German Consulate; "Trees for the Dry-farm", by Mr. C. E. Legat, B.Sc., Acting Conservator of Forests (Transvaal Conservancy).

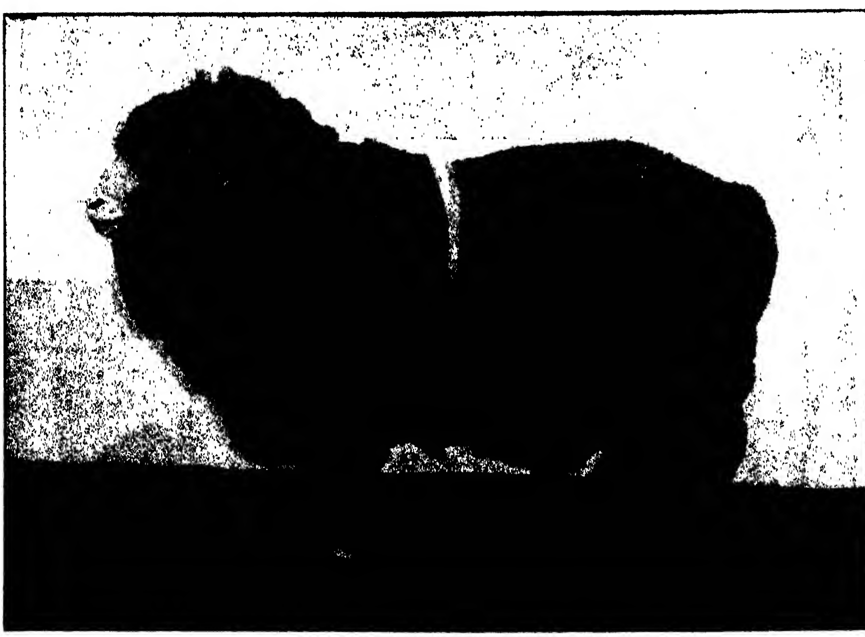
Mr. Burtt-Davy's paper appears elsewhere in this issue.

A visit of inspection to the Dry-land Station at Lichtenburg, on the 20th, brought the proceedings to a close.

More Imported Tasmanian Merinos.

MESSRS. C. ADAMS & SONS, the well-known stud merino breeders, of Glen Roy, Tarkastad, Cape Province, have recently landed another consignment of highly bred Tasmanians. Among these are the animals shown in the photographs herewith.

"Client" was four years old in July last. His sire was Voce-Patron II, by Vice-Patron, by Patron, by President III, by President II, by President. Dam a special stud ewe by Vice-President II. This ram was first and champion at the Sydney Sheep Show last July.

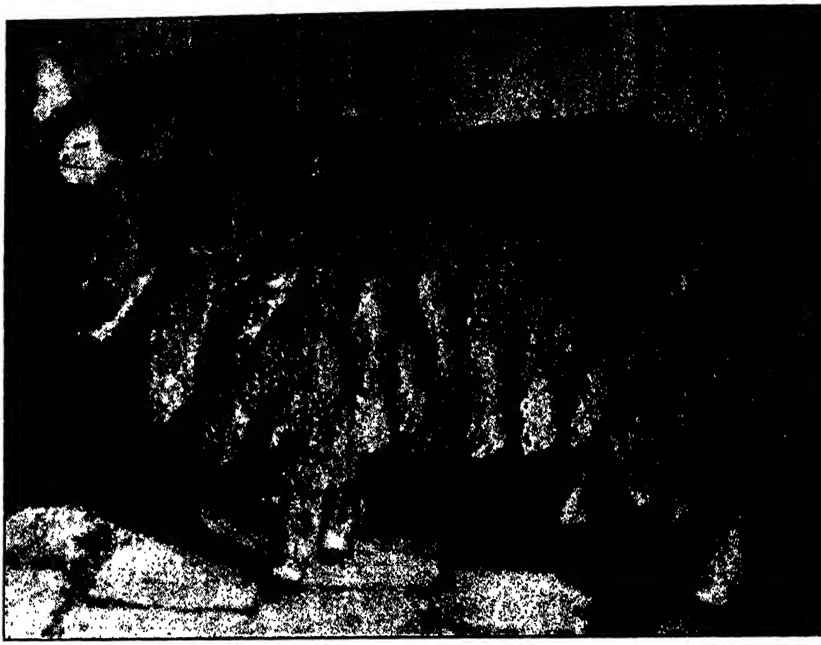


Imported Tasmanian Ram, "Client".

"Magic V" is rising six years old. His sire was Magic II, by Magic, by Magician. The dam was by Trojan, by Paris, by Priam, by Primus. With this ram Messrs. Adams imported two young rams, his progeny.

"Musician is three years old. His sire was Magician II, by Magician, by Hercules, by Royal Hero. Dam No. T275, by Sir Allan, by President. Granddam No. 594v, by Royal Hero II.

More Imported Tasmanian Merinos.



Imported Tasmanian Ram, "Magic V

Imported Tasmanian Ram "Musician".

Notes on the Loquat (*Eriobotrya japonica*).

By E. Pillans, Government Horticulturist (Cape).

This fruit, widely grown along the coast belt of the Cape, is one to be commended, as it ripens its crop when other fruits are comparatively scarce. Little appears to have been done as yet towards improving it with a view to reducing the number of seeds it contains and increasing the size of the pulp. A few, by selection, have propagated some really first-class varieties here; others, again, by judicious pruning and reducing the number of branches the tree is allowed to carry, as well as by liberal feeding, have been rewarded by a crop of large luscious fruits. This department has of late imported two first-class varieties of loquats, which the growers claim to be a marked improvement on sorts previously known. These are the Advance and Victor; both are said to be very prolific. The former produces fruit of a peculiar pear shape, often as much as 3 inches in length and from 1 to 1½ inches in diameter. The colour is bright orange when fully ripe; the flavour distinct and very sweet, somewhat of the taste of a cherry. It is also commended for its keeping qualities if gathered when fully ripe and not bruised; this enables it to be transported to distant markets. Victor is said to be the larger of the two; its colour is from pink to red, and the quality not below that of Advance. For canning, it is claimed to be the best sort known.

These new importations are being grown under supervision, in order that scions and buds mav be taken from them for distribution when ready. As the trees are yet young, two or three seasons must elapse before they can safely be cut from for issue of buds or grafts.

Propagation of the loquat should be by grafting or budding. The latter method experience has taught me to be preferable. Raising trees from seeds, even from good kinds, except for working upon, seldom produces anything worth having; budding from selected mother trees is the only reliable way of getting what you want. Years of trial from seed has only given me two better kinds than I had previously known. Even young trees imported from Madeira have produced disappointing results when treated as the loquat usually is here, and it was only by pruning and heavy manuring that they bore a crop anything like in size and quality what one is accustomed to see produced on the island.

Seedlings raised and kept in tins in order that they may be put under shade for a week or two after budding, and so that they may be transplanted with safety afterwards, should be ready for working upon during their second year of growth. Shield-budding is the simplest and best method when working on to the young tree. The removal of the slice of wood contained in the bud is not necessary. A sharp and clean knife should be used when severing the bud from the stick. The slice of bark and wood taken (which contains the bud) should not be too large or too thick. Always make the incision in the

bark of the young tree to receive the bud before you cut the bud eye from the parent tree. This assists greatly in saving the time to which the bud is exposed to the air before it is put into position. Remember that no bud will grow that has its bark or heartwood damaged, hence the insistence on the use of a clean sharp knife for cutting out the bud from the parent tree. The bandage used in tying may be drawn somewhat tighter than is usual when working other varieties of fruits. Here, at the Cape, the month of November is the best time for budding the loquat. The tree ripens its fruit in early spring, and makes a second growth directly after the crop has been taken off. It is at this period that I have pulled off most successes.

There are early, medium, and late varieties of these fruits, and growers should see to it when putting out their trees that they have a sprinkling of each in their orchards.

The pruning of the trees may be started when they have attained a height of from 4 to 5 feet. The central or axial growth, usually the leading stem, should be cut out up to where it meets or joins the laterals; this at once forms a low-headed tree. In after years the central growth from each of the leading boughs should be cut out, also at where they meet their laterals. This simple method may be continued in after years; it will be found sufficient for all the thinning and pruning that is necessary for the tree. All that is further required is the removal of any branches of fruit that may be in excess of what the condition of the tree would permit to mature to the highest state of perfection. The proper time for pruning is just after the crop is gathered. As far as I know there is no fruit tree that is a more greedy feeder, nor is there any that will so cheerfully respond to all you give it, hence a liberal application of old, well-rotted farmyard manure applied yearly in early winter will have the effect of improving greatly both the quality and quantity of the crop. I could give many instances where the fruit of an ordinary loquat tree has increased to four times its usual size after pruning and liberal feeding. Usually the tree is left to care for itself and a regular crop of fine fruit is expected from it without the ordinary care which is so necessary for the well-being of all fruit trees. It is to be hoped that with the importation of the better varieties into this country the hitherto much neglected loquat will find its place, through intelligent culture and attention, among the best table fruits at the Cape.

Roses and Rose Growing.

By A. E. Bester, Acting Government Horticulturist (Transvaal).

For the purposes of this article roses may be roughly divided into sections, as follows:—

Hybrid Perpetuals, under which designation come the hybrids of *Rosa gallica, damascena*, and *centifolia*, natives of Europe and Western Asia. These, although called Hybrid Perpetuals, do not, with a few exceptions, bloom nearly as freely as those of the other sections, and are not nearly so suitable for the average South African garden as the Teas and Hybrid Teas. The exceptions I have in mind are Frau Karl Druschki, Margaret Dickson, Mrs. John Laing, Madam Gabrielle Luizet. Fair examples of Hybrid Perpetuals are: Duke of Edinburgh, A Carriere, Prince Camille de Rohan, Eclair, Baron de Bonstetten, Baroness Rothschild, Louis van Houtte, Merville de Lyon, Ulrich Brunner.

Teas, which have been evolved from a sub-species of *Rosa indica*, viz. Fragrans, and, as the name denotes, the originals came from Asia. Good examples of these are: Madam Hoste, Madam Lambard, Francisca Kruger, Duchesse de Auerstadt, Lady Roberts, Catherine Mermet, Archimede, Comtesse Riza du Parc, Ernest Metz, Meta, Medea, Safranot, Jules Finger, Souvenir de Catherine Guillot, Perle de Jardnins, Maman Cochet, White Maman Cochet, The Bride, Marie van Houtte, Princess de Sagan, Christine de Noue. I have given this list, not because I consider it the finest selection, but because these varieties are a success all over South Africa.

Hybrid Teas, as their name suggests, have been produced by the crossing of Hybrid Perpetuals and Teas, and are a comparatively recent introduction, the oldest of these being La France. It is only about forty years since that variety was produced. For quite a long time after this the production of Hybrid Teas was limited to a few varieties. During the last fifteen or twenty years their numbers and beauty have rapidly increased, and their popularity appears, with good reason, to increase correspondingly. Good examples of these are Liberty, Kaiserin Augusta Victoria, Grace Darling, Gruss an Teplitz, Augustine Guinoisseau, Belle Siebracht, Florence Pemberton, Killarney, Bessie Brown, Lady Battersea, Countess of Pembroke, Alice Graham, Mildred Grant.

Noisettes, which are only a sub-species again of *Rosa indica* and subsequent hybrids of that variety and Moschata, were first introduced to the horticulturists in 1600 by Monsieur Noisette, and take their name from him. This type flowers in bunches and is totally distinct from the Polyantha. In the Noisette the central bud of the bunch is usually developed and finished before the remainder are more than half developed. With the comparatively rapid transport which we enjoy it does not appear to us such a difficult matter for Monsieur Noisette to take roses from India to Europe, but when we consider that the journey then took as much

as four months or longer one realizes what an amount of personal attention, what care to shelter and yet keep alive, not to mention the time and expenditure, were necessary to introduce these plants. Considering all these things one cannot help but feel that such men were working more for the love of flowers than for any monetary advantage they might eventually reap.

Examples: Marechal Niel, Aimee Vibert, Caroline Kuster, Madame Pierre Cochet, Solfaterre, William Allen Richardson.

The *Polyantha*, which may be said to flower in clusters, or perhaps the simplest way would be to say, panicles, is probably of the same parentage as the previous sub-variety, at any rate, on one side. The close packing of the flowers in their clusters and the almost simultaneous opening and development of the bunch is particularly noticeable in such varieties as Crimson Rambler (which is supposed to have come to us from Japan), Euphrosyne, Aglaia, Dorothy Perkins; these are fair examples of the type.

Bourbons are also a *Rosa indica* sub-species, and were supposed to be introduced from the Isle of Bourbon early in the Nineteenth Century. There is not a large number of examples of this section, the best known being Souvenir de la Malmaison.

China, or as they are mostly known, monthly roses, were introduced from China in the latter part of the seventeenth century, and are also known as Bengal roses. They belong to the order Rosa semperflorens, and are valuable as garden or decorative. The blooms are, as a rule, thin and semi-double.

Examples: Blush, Laura Messimy, Comtesse du Cayla (reddish-orange), Madam Eugene Resal.

Other species which I have not so far mentioned are: Banksia, Moss Rose (*Rosa centifolia muscosa*), Wichuriana, Rugosa, Scotch Rose (*Rosa spinosissima*), Sweet Briar (*Rosa rubingosa*), and hybrids of these, not to mention some twenty-five other species which I find listed but which are scarcely worth detailing, such as Microcarpa, Pissardii, Pomifera, Rubrifolia, Anemoneflora.

I propose to give a brief summary of the methods of propagation. I do not intend to take up the thorny question as to whether roses grown from cuttings or worked (either grafted or budded) are the best, beyond stating my own experience, and that is, that one method is preferable to the other and vice versa according to the particular rose and the soil on which you wish to cultivate it. Although many varieties succeed equally well if either system is adopted, yet some appear to develop better bloom on their own roots (cuttings), whilst others appear to develop better colour when budded or grafted. Possibly, in the latter varieties, *it is due to weak root action that colour is poor on own roots of that particular variety.* Suitability of soil, etc., has great influence in the matter. A sandy soil, inducing free root action, would suit a cutting rose better than a heavy clay soil, but the coloration of a grafted or budded rose on a clay soil is frequently much more richly developed than with a cutting rose. Now, having said this much on the debateable question, I shall deal with the methods themselves.

First.—*Cuttings.* This is probably the oldest method. The system usually adopted is to make a cutting from 9 in. to 12 in. long from current year's growth, but wood must be ripe, cutting the base just below an eye. It is usually found that small wood well ripened roots better than large wood, and is less likely to rot before

rooting than the larger sappy growth. I find it best, if soil is of a stiff clayey nature to open a trench about 6 in. to 8 in. deep and put in about 3 in. of sand, placing the base of the cutting well in the sand and filling up the trench with soil which is free from lumps; from one to two eyes of the cutting should remain exposed above the soil. In other words, there is a small ridge formed right along the row of cuttings. This allows of irrigation between the rows without having to flood all the ground. All the eyes, with the exception of the three top ones, should be removed. Roots will be formed mostly at the base, but small ones, in many cases, will also be formed where the eyes have been removed. If it is desired to have a short stem between the ground level and the head of the tree, these, or some of them, can be removed when the tree is planted out in its permanent quarters the following July.

Before leaving the subject of cuttings I should state that some varieties are very easily propagated, such as Gruss an Teplitz, Frau Karl Druschki, Margaret Dickson, Archimede, whilst others, such as Marechal Niel, Niphetos, and some of the Dijon type are extremely difficult, and this is one of the reasons for the next method which I propose to deal with, viz., budding.

The stocks used for this purpose in England are three, viz., *Rosa canina* (Dog Rose), the Manetti, and Griffarae stock. The latter is only used occasionally, the Manetti only for Hybrid Perpetuals and Hybrid Teas, whilst the Dog Rose is suitable for any variety, and although the resultant growth of Hybrid Perpetuals is not so rank as if budded on the Griffarae or Manetti, yet the nurserymen of England are growing less on the Manetti than in previous years. For the dwarf roses, such as are mostly grown in this country, seedling dog rose or briars as they are called, as well as cuttings of briars and *Rosa multiflora* are the main stocks.

The operation of budding, which is usually performed in March, consists of removing one of the eyes with a shield of bark from the desired variety and inserting this beneath the bark of the stem of the stock, binding tightly with some material such as raffia or waxed calico, or even worsted. This is allowed to remain on until the bud is said to have taken, that is, until the junction between the stock and the bud has taken place—about fourteen to twenty-one days. The tying material is then loosened and the bud allowed to remain dormant until the following spring. Occasionally in this country if the bud is inserted, say, in October or November, growth will start at once, and in that case it will be found advisable to remove the top of the stock, and this is one of the reasons why nurserymen favour budding, as a saleable tree can be produced by this means in six months.

Grafting is performed during the period of dormancy and consists of the splicing, so to say, of a small length containing two eyes of the desired variety on to some suitable stock, but is not advised, as it is a slow process compared with budding.

Layering is also practised with such varieties as the Banksia, but this is not necessary in this country, as the Banksia roots in sand quite freely from cuttings.

New varieties are raised from seed and also from sports; the latter is really a freak of nature, which is not confined to roses. Many of the climbers have originated in this way. An ordinary dwarf growing variety will suddenly develop a strong, rampant

growth from one shoot, and this is carefully watched and probably budded on to stocks the following season when its fixity or otherwise is determined. Cleopatra, Kaiserin Augusta Victoria, Frau Karl Druschki, Caroline Testout are amongst these; variations of colour also arise in the same manner, and are propagated.

You will easily see that the nurseryman has many points in favour of budding, as with a new variety he can propagate probably 10 to 1 as against cuttings, and as the new varieties command the high prices only whilst they continue new and scarce it follows that in order for him to reap the benefit he must get as many as possible whilst the variety remains among the so-called new roses.

It is well to point out that many so-called new roses in this country have been in existence for years, and they are frequently new only to the nurseryman who lists them as such. I should like to see each nurseryman place by the side of the name of each rose the name of the raiser and the year in which it was first offered to the public by the raiser. This is done in one or two cases in South Africa.

Planting.—The ground should be trenched at least 18 in., and where this is not possible holes 18 in. in diameter should be dug and the bottom well broken up. Rotten kraal manure should be well dug into the soil before planting. The preparation of the ground should take place three months before planting.

Trees if budded should be planted with the junction 1 in. to 2 in. below the surface. If trees are only one year's growth at planting cut back to three to four eyes unless weak in growth, and then two eyes. In subsequent years remove all weak and unripe wood. (Frequently growth is thrown up late in the season which is sappy, and although this looks thicker than some of the hard wood, if allowed to remain the resultant growth will be small and unsatisfactory.) Cut back the ripe wood to two or three eyes if growth is weak, and not more than four if growth is strong.

Water should be given immediately after planting, and I find it a good plan to mulch the surface with a couple of inches of manure. Water can be given on this manure when required, say, every week until growth commences.

Shading newly planted trees if the weather is hot and windy, or if trees have been kept in the dark and growth has started, is most essential; many trees are lost through lack of shade at planting.

Blooms for show and decoration.—In growing blooms for show the trees must be treated to severer pruning than would otherwise be necessary, and certain varieties more severely than others. Many of the best exhibitors in the Old Country reduce the tree (mostly budded) down to one eye. The best blooms, of course, on strong growing varieties are taken from young budded trees, but this is merely because the growth of a dormant bud has probably a two or three year-old root system to force it. In the same way, if a two-year-old cutting is cut back each year to one eye, the resultant blooms will—barring accidents—be in proportion. Thin as soon as the buds are developed sufficiently to handle and spray each evening until the bloom begins to open. Shading and tying in with soft worsted or wool increases the size. This wool is not removed until the exhibitor is preparing to leave the stand for the judging to commence.

The thinning of buds is not so necessary when the roses are only grown for decorative purposes, but even in this case one frequently finds that in order to cut a good long stalk it is necessary to sacrifice

three or four buds. Had these been removed in the early stages the main bloom would have been so much the better.

Never allow the old blooms to remain on and seed heads to form. This forming of seed takes more out of a tree than the production of three times as many flowers. Further, whilst seed is being formed, the shoot on which this is taking place either sends out no more growth or the growth is weak and spindly, and the flower probably only reaches the embryo stage and is never thrown above the terminal leaves. These small weak growths are also frequently seen on trees which have been allowed to remain too full of wood, perhaps nine or even a dozen eyes of the previous year's growth having been allowed to remain at the winter pruning. These growths, when they are formed, should be removed. It is seldom they do any good, and most certainly take away nourishment from the stronger growths and blooms.

Colouring.—It has been frequently pointed out to me that descriptions in various catalogues cause difficulty in deciding as to whether a rose is the one sent for or not, or in other words whether some other variety has not been substituted. Now, taking such a well-known rose as Maman Cochet, I find these descriptions taken from five catalogues:—

No. 1. B.—Flesh suffused and tinted salmon pink.

No. 2. D.—Carmine suffused salmon yellow.

No. 3. R.—Deep flesh colour. Pointed globular. (How can a thing be a globe and pointed?)

No. 4. F.—Rose flesh shaded salmon yellow.

No. 5. P.—Flesh rose shaded carmine salmon yellow.

Now, I ask you whether after reading such a varied description any person who had never seen the rose could say whether he or she had obtained a true one? This is only an example picked because I thought this to be about as well known here as any rose. The same applies in many cases, particularly if the coloration partakes of a mixture, so few people being really able to determine the true colour.

The French Society of Chrysanthemum Growers and the French Rosarians have published a collection of some 365 colours; many, in fact most of these, contain four variations, which are classed as the one particular colour. This has been done solely because of the extreme difficulty experienced by many nurserymen and others in correctly designating the colour of new varieties, etc., and it is to be hoped may be used by all of them.

The principal pests of the rose are:—

The so-called rose beetle; hand-picking appears to be the only satisfactory method of dealing with these. Aphis: this can be kept in check by the use of a solution of tobacco extract, Lion brand—1 part to 80 of water. Mildew, which causes the curling up and dropping of the leaves, should be treated as soon as it appears. Spray with sulphide of potassium, ¼ oz. to ½ oz. to a gallon of water; use soft water if possible. Black spots, which frequently cause most of the leaves to drop, may also be treated with this, or ammoniacal carbonate of copper solution.

In conclusion, I would say, if you want good roses, manure well. Mulch with good strong manure and dig this in the following winter, say July, giving at that digging a good handful of bone meal to each tree and mulching again. Many roses cannot stand the hot dryness of our soils, and blooms are poor; this mulching keeps the soil cool and helps the tree to produce a good firm bloom.

Outbreaks of Animal Diseases.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF SEPTEMBER IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

Province and District.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
1.—CAPE PROVINCE—										In the Cape Province, Scab is dealt with by the Sheep Inspector's Department.						
Barkly East	.	.	.	.	1	.	.	.	.		.	.	.	.	.	.
Cape	1	.	.	.	.	.	.	2	.		.	.	.	.	.	.
Cathcart	.	.	.	.	.	.	.	.	.		.	.	.	.	.	1
East London	.	.	3	.	.	.	.	.	.		.	.	.	.	.	1
Herschel	.	.	.	.	.	.	.	.	.		.	.	.	.	.	1
Humansdorp	1	.	.	.	.	.	.	.	.		.	.	.	.	.	.
Kingwilliamstown	.	.	3	.	.	.	.	.	.		.	.	.	.	.	2
Komgha	.	.	.	.	.	.	.	.	.		.	.	.	.	.	1
Mafeking	.	.	3	.	.	.	.	.	.		.	.	.	.	.	2
Piquetberg	.	.	.	1	.	.	.	.	.		.	.	.	.	.	.
Stellenbosch	.	.	.	.	.	.	.	1	.		.	.	.	.	.	.
Stutterheim	.	.	.	.	.	.	.	.	.		.	.	.	.	.	1
Vryburg	.	.	1	.	.	.	.	.	.		.	.	.	.	.	.
Native Territories:—																
Tembuland—																
Umtata	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Engcobo	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.
St. Marks	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Mqanduli	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Transkei—																
Idutywa	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nqamakwe	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
Port St. Johns	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Willowvale	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF SEPTEMBER IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

Province and District.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
I.—CAPE PROVINCE (*continued*)—																
Native Territories:—																
Pondoland—																
Ngqeleni	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bizana	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
East Griqualand—																
Umzimkulu	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
II.—NATAL—																
Newcastle	.	.	.	.	.	.	.	.	.	14	.	.	1	.	.	.
Dundee and Umsinga	.	1	.	.	.	.	.	.	.	34	.	.	.	.	.	.
Klip River	.	1	.	.	.	.	.	.	.	26	.	.	.	.	.	.
Bergville	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Estcourt	.	2	.	.	.	.	.	.	.	26	.	.	.	.	.	.
Weenen	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Umvoti	.	.	.	.	.	.	.	.	.	13	.	.	.	.	.	.
New Hanover	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Inanda	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Lion's River	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Pietermaritzburg and Umgeni	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Ipolela	.	1	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Ixopo	.	.	.	.	.	.	.	.	.	9	.	.	.	.	.	.
Alfred	.	7	.	.	.	.	.	.	.	1	.	.	.	1	.	.
Lower Umzimkulu	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Alexandra	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vryheid, Ngotshe, and Babanango	.	.	.	.	.	.	.	.	.	97	.	.	14	.	.	.
Utrecht	.	.	.	.	.	.	.	.	.	17	.	.	5	.	.	.
Zululand	.	.	.	.	.	.	.	.	.	13	.	.	6	.	.	.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF SEPTEMBER IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

PROVINCE AND DISTRICT.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
III.—TRANSVAAL—																
Barberton	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bethal	.	.	.	.	.	.	.	.	.	17	.	.	.	.	.	.
Bloemhof	.	.	.	.	.	.	.	.	.	62	.	.	.	.	.	.
Carolina	.	.	.	.	.	.	.	.	.	41	.	.	.	.	.	.
Ermelo	.	.	.	.	.	.	.	.	.	29	.	.	.	1	.	.
Heidelberg	.	.	.	.	.	.	.	.	.	24	.	.	.	.	.	.
Krugersdorp	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
Lichtenburg	.	.	.	.	.	.	.	.	.	25	.	.	.	.	.	.
Lydenburg	.	.	.	.	.	.	.	.	.	31	.	.	.	.	.	.
Marico	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Middelburg	.	.	.	.	.	.	.	.	.	31	.	.	.	.	.	.
Piet Retief	.	.	.	.	.	.	.	.	.	10	.	.	.	.	.	.
Potchefstroom	.	.	1	.	.	.	.	.	.	37	.	.	.	.	.	.
Pretoria	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.
Rustenburg	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Standerton	.	.	.	.	.	.	.	.	.	42	.	.	.	.	.	.
Wakkerstroom	.	.	.	.	.	.	.	.	.	14	.	.	.	.	.	.
Waterberg	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Wolmaransstad	.	.	.	.	.	.	.	.	.	31	.	.	.	.	.	.
Witwatersrand	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.
Zoutpansberg	.	.	.	.	.	.	.	.	.	25	.	.	.	.	.	.
IV.—ORANGE FREE STATE—																
Bethlehem	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Bethulie	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF SEPTEMBER IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

PROVINCE AND DISTRICT.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
IV.—ORANGE FREE STATE (*continued*)—																
Bloemfontein and Brandfort	.	.	.	.	.	.	.	1	.	17	.	.	.	.	.	.
Boshof	.	.	.	.	.	.	.	.	.	43	.	.	.	.	.	.
Edenburg	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Fauresmith	.	.	.	.	.	.	.	.	.	40	.	.	.	.	.	.
Ficksburg	.	.	.	.	.	.	.	.	.	9	.	.	1	.	.	.
Frankfort	.	.	.	1	.	.	.	.	.	2	.	.	.	.	.	.
Harrismith	.	.	.	.	.	.	.	.	.	15*	.	.	.	.	.	.
Heilbron	.	.	.	.	.	.	.	.	.	9	.	.	.	.	.	.
Hoopstad	.	.	.	.	.	.	.	.	.	18	.	.	.	.	.	.
Jacobsdal	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.
Kroonstad	.	.	1	.	.	.	.	.	.	10	.	.	.	.	.	.
Ladybrand	.	.	.	.	.	.	.	.	.	†	.	.	1	.	.	.
Lindley	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Philippolis	.	.	.	.	.	.	.	.	.	11	.	.	.	.	.	.
Rouxville	.	.	.	.	.	.	.	.	.	28	.	.	.	.	.	.
Senekal	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.
Smithfield	.	.	.	.	.	.	.	.	.	39	.	.	.	.	.	.
Thaba 'Nchu	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Vrede	.	.	.	.	.	.	.	.	.	13	.	.	.	.	.	.
Vredefort	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
Wepener	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
Winburg	.	.	.	.	.	.	.	.	.	19	.	.	.	.	.	.
Trompsburg	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.

* Incomplete. † Not received.

Milk Records.

ELSENBURG COLLEGE HERD.—SEPTEMBER, 1911.

Breed and Name of Cow.	Days in Milk.	Yield in Lb.		
		During September.	Total to Date.	Daily Average.
Frieslands.				
Rose	379	629	9524	25·1
Bell	308	509	6676	21·6
Veronica	285	507	5282	18·5
Cato	217	266	1988	9·1
Victoria	189	640	4654	24·6
Anna	175	339	1934	11·0
Christina 58	175	467	2859	16·3
Daisy	137	818	3581	26·1
Violet	126	765	3820	30·3
Beauty	124	1402	5060	40·8
Vera	124	996	4110	33·1
Belladonna	86	920	2982	34·6
Romula	14	470	470	33·5
Christina 54	5	129	129	25·8
Jerseys.				
Gwendolen	168	596	3053	18·1
Gertie	168	534	3591	21·3
Grace	151	541	2721	18·0
Gus...	143	513	2414	16·8
Gladys	142	577	2798	19·7
Gilliflower...	122	283	1532	12·5
Fanny	108	688	2384	22·0
Gipsy	82	721	2138	26·0
Evelyn	81	445	1203	14·8
Nellie	43	841	1213	28·2
Glee	30	994	994	33·1
Ayrshire.				
Lobelia	153	571	3249	21·2
Queen Dot...	1	38	38	38·0
Cross.				
Bessie	81	1420	3635	44·8

The following are the average percentages of butter fat:—

Frieslands	=	3·20 per cent.
Jerseys	=	4·64 „
Ayrshires	=	3·80 „

TWEESPRUIT EXPERIMENTAL FARM—AUGUST, 1911.

Breed and Name of Cow.	Date of Last Calving.	Lb. Milk.	Fat Test.
Frieslands.	1910.		%
Nora	20th October	532	3·4
Gertje	13th October	657	3·4
Japke	1st June	493	3·6
Dijkstra	18th November	446	2·6
Trijntje	13th December	642	3·0
	1911.		
Anna	10th January	586	2·8
Rinske IV.	7th May	1096	2·6
Veeman	11th April	1138	2·4
Rinske III.	18th August	722	—
Red Lincolns.	1910.		
Daphne	22nd December	277	3·4
	1911.		
Dirce	28th May	701	3·2
Crino	6th June	816	3·0
Burton Fuchsia	July	917	3·4

GROOTVLEI EXPERIMENTAL FARM—AUGUST, 1911.

Breed and Name of Cow.	Date of Last Calving.	Lb. Milk.	Fat Test.
South Devons.	1910.		%
Primrose	13th October	277	4·0
	1911.		
Bertha	31st January	404	4·3
Dauntless	1st May	525	4·3
Sweetheart	18th March	418	4·1
Eva	3rd May	693	4·1
North Devon.			
Gentle	20th June	519	4·2

TWEESPRUIT EXPERIMENTAL FARM—SEPTEMBER, 1911.

Breed and Name of Cow.	Date of Last Calving.	Lb. Milk.	Fat Test.
Frieslands.	1910.		%
Nora	20th October	485	3·8
Gertje	13th October	539	3·8
Japke	1st June	463	4·0
Dijkstra	18th November	375	3·0
Trijntje	13th December	543	3·2
	1911.		
Anna	10th January	499	3·0
Rinske IV.	7th May	1042	3·0
Veeman	11th April	1052	2.8
Rinske III.	18th August	1785	3·0
Red Lincolns.			
Dirce	28th May	605	3·6
Crino	6th June	805	3·2
Burton Fuchsia	July	843	3·8

GROOTVLEI EXPERIMENTAL FARM—SEPTEMBER, 1911.

Breed and Name of Cow.	Date of Last Calving.	Lb. Milk.	Fat Test.
South Devons.	1911.		%
Bertha	31st January	273	4·4
Dauntless	1st May	435	4·0
Sweetheart	18th May	341	4·2
Eva	3rd May	630	3·8
Poppy	6th September	533	3·2
North Devon.			
Gentle	20th June	453	3·9

Results of Egg-Laying Competitions.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

Fourth Egg-Laying Competition.—16th May, 1911, to 15th May, 1912.

RECORD FOR SEPTEMBER 1911, AND TOTALS TO END OF SEPTEMBER.

Pen Number.	Owner.	Breed. (Six Birds to a Pen.)	Record for Month. Eggs.	Weight. oz.	dwts.	Total to Date. Eggs.	Weight. oz.	dwts.	Position to Date.
1	F. W. Nicholson..	Buff Orpingtons..............	96	198	4	160	335	15	23rd
2	F. T. Hobbs	Silver Wyandottes............	101	199	9	174	333	6	25th
3	A. Riley.........	Black Minorcas (R.C.).........	99	197	5	178	334	7	24th
4	N. Cole	White Leghorns (Amer.)	116	226	13	284	549	7	14th
5	S. T. Jones	White Leghorns (Amer.)	112	241	7	281	596	6	11th
6	H. Curtis..	White Leghorns (Amer.)	110	233	5	316	656	4	5th
7	S. C. Skaife......	White Wyandottes............	97	179	15	224	401	13	21st
8	A. Keppie.......	White Wyandottes............	105	198	6	250	457	3	20th
9	S. A. West.......	White Leghorns (Amer.-Danish)	83	184	5	254	518	15	15th
10	H. H. Bright.....	Black Leghorns	120	242	2	346	688	15	4th
11	B. Kauffmann ...	Brown Leghorns	113	233	2	292	612	11	10th
12	B. Kauffmann ...	Black Leghorns	94	204	8	226	485	2	18th
13	C. W. Pilkington.	Rhode Island Reds	82	178	1	147	327	3	26th
14	W. P. Cowan	White Leghorns (Eng.)........	120	241	1	345	650	13	6th
15	A. J. Stacy......	White Leghorns (Aust.-Amer.) (Re-entered from last competition for second year test.)	128	269	15	332	708	1	2nd
16	B. Kauffmann ...	White Leghorns (Eng.-Amer.)..	113	241	12	335	690	2	3rd
17	S. Smith	Brown Leghorns	111	227	13	263	537	11	17th
18	Mrs. H. H. Bright	White Leghorns (Aust.).......	130	246	9	326	614	15	9th
19	N. Cole	Brown Leghorns	110	230	5	297	628	9	8th
20	F. Molteno	White Leghorns (Amer.)	106	197	3	299	548	13	16th
21	C. H. van Breda..	White Leghorns (Aust.)	117	232	1	379	739	15	1st
22	Mrs. C. H. van Breda	White Leghorns (Amer.)........	104	205	13	297	579	7	13th
23	S. A. West.......	Brown Leghorns	106	204	13	313	595	12	12th
24	Graham, Hope & Co.	White Wyandottes	121	241	15	237	470	13	19th
25	R. V. R. Jones ...	White Leghorns (Amer.-Aust.).	93	182	12	179	347	8	22nd
26	S. Smith	White Leghorns (Dan. & Amer.)	133	261	5	327	630	8	7th

MANAGER'S REPORT.

The total number of eggs for the month was 2820, an average of 94 per day, and just over 18 per bird. Forty-eight have laid less than this average, and fourteen have each laid more than 23 eggs. The highest total in one day was 113 on the 25th, the lowest 63 on the 2nd; on the 14th pen 5 (six birds) contributed seven eggs, No. 28 laying two, one at 8 a.m. and the other at 4 p.m. To some this may seem profitable, but, as a general rule, it certainly is not, unless the bird has an unusually good stamina and strong constitution, for it is too great and sudden a strain on the organs and glands which take part in the development of an egg, with the result that their vitality, and incidentally that of the whole system, is lowered, and they and it require time to recuperate, as in the case of this bird, for from the 1st to the 14th inclusive she laid eleven eggs, and from the 14th to the end of the month only six.

Every bird has laid during the month, although ten have each contributed less than ten eggs. I am pleased to be able to report that the heavy breeds have, on the whole, done well, especially pen 24 (White Wyandottes), which in number of eggs takes fourth place for the month with a total of 121; the eggs from these breeds have increased in size, although there is still room for improvement in this respect. The size of those laid by the

light breeds is excellent, the majority averaging for the whole about 2¼ oz. each. The six pens which have contributed the highest number of eggs for the month are :—No. 26, 133; No. 18, 130; No. 15, 128; No. 24, 121; No. 10, 120; and No. 14, 120; and thirteen others each over 100. Four birds have laid more than twenty-four eggs, No. 89 again heading the list with twenty-eight, closely followed by Nos. 56 and 155, with twenty-six each, and No. 46, with twenty-five eggs. The following have laid twenty-four each :— Nos. 16, 19, 40, 96, 105, 106, 108, 141, 151, and 153. The six birds laying the greatest weight of eggs are : No. 89, 61 oz. (only 11 drams less than her own weight); No. 96, 55 oz. 3 drams; No. 155, 51 oz. 3 drams; No. 141, 50 oz.; No. 52, 49 oz. 4 drams; and No. 106, 48 oz. 2 drams.

The health of the birds.—All, with one exception, have been and are in excellent health and good hard condition, not one having required treatment of any sort, except, of course, their periodical dose of epsom salts all round. Especially in hot weather is this necessary, and I am sure if all poultry keepers and breeders adopted it there would be fewer or no cases of death from heat apoplexy and kindred ailments. The best method of administering it is, by solution in the water used for mixing the soft food. The exception mentioned above was the case of sudden death of a bird on the night of the 26th, which, on making a post-mortem, I discovered to be due to acute peritonitis, set up by the rupture of an ovisac, allowing the contents to flow into the abdominal cavity. When we consider how very thin this membrane is, we can easily realize that a sudden fright, a fall from the perch, or a general lowered vitality of the bird, etc., may cause its rupture, and I have no doubt that many sudden deaths of birds, the cause of which is unknown or attributed to something else, are due to this. I would advise all poultry breeders always to make a post-mortem (or get some one to do so) on every bird which dies, whether they have diagnosed the cause of death or not. We never know what it will reveal, and can always derive an immense amount of benefit from it. I know that usually it is a case of : "The bird is dead, it is of no more use, throw it on the scrap-heap". But it is of great use (possibly of more use than when it was alive) as an object-lesson for the future, and probably the means of saving the lives of other birds. This rupture of the ovisac must not be confused with the breaking of an egg in the oviduct, which causes inflammation of that organ (netritis) and is quite a different thing, and if treated at once may often be cured (although death is caused by it sometimes), but rupture of an ovisac is always fatal, and very quickly so.

While alluding to the excellent health and good hard condition of the birds, I should like to mention that several of the many who have been here to see them and the arrangements of the pens and houses, remarked that they expected to find them "nicer looking", by which term they meant, like the birds got up for show, as seen in the show pen. Of course I pointed out that they were here for business, not ornament, and, provided they were in good hard condition and laid well, their looks and plumage were minor points. Others again have remarked upon the want of uniformity of type in the White Leghorns, and naturally so, for considering that there are four different types and crosses of these, there is a great want of uniformity, not only in the pens, but, in the case of crosses, in individuals in the same pen; and to remedy this as far as possible in White Leghorns in this country is one of the many objects the South African Utility White Leghorn Club, just inaugurated, has in view, and it is to be hoped that breeders will be sufficiently patriotic to breed to the South African type (and also join the Club), a standard for which is now being carefully drawn up by the Committee; and I may also add sufficiently self-interested, for it will be a type the different points of which include those, and only those, which are found in prolific layers, in birds of sound constitution and stamina, and which are best suited to the general climatic conditions of South Africa.

Broodiness, I regret to say, has been rather troublesome this month (the total egg yield would possibly have reached 3000 had it not been for this). Fifteen birds have been affected by it, one or more in all the heavy breed pens, with the exception of No. 24, White Wyandottes (probably it has been bred out of the strain from which these birds originate), and also one bird in each of two light breed pens. Fortunately I have been able to break it up in periods varying from two to seven days—in the majority of cases in three days. All are now laying again, with the exception of three, the period of non-laying varying from three to sixteen days. I know some breeders and even some authorities on poultry breeding advise allowing the bird to continue broody, and giving them eggs, in order that they may have a rest. This I do not agree with, for I maintain that if birds are properly cared for and kept well and strong they require no rest. The usual period which is or should be allotted for a fowl's life is two and one-third years; after this her laying qualities begin rapidly to fail, and she becomes unprofitable. During this period, therefore, we naturally wish to obtain as many eggs from her as possible, so why allow her to waste any of it by going broody? Here, in a laying competition, we certainly don't wish it, and in these days of incubators poultry breeders, especially those with a large number of birds, should endeavour to breed it out of them, as it is quite possible to do.

The weather on the whole has been fairly good for laying; we have had more or less wind every day, usually from the north-west, twelve fine, warm, sunny days, and eleven

on which rain fell; the 16th, 17th, and 18th were very wet ones, and the total egg yield on those days was 100, 96, and 107 respectively, notwithstanding that the birds on each of those days went wet to roost (which, of course, was unavoidable), and this, I think, speaks well for their health and condition. Five days were exceptionally dull and cloudy, and such days, as they do upon ourselves, seem to have a depressing effect on the birds, and this, I notice, is apt to lower the egg yield slightly.

Before I conclude this report I should like to add a word or two on line-breeding and maturing, to which I alluded last month, as I have since had inquiries with reference to it from several who were of the opinion (which is shared, I know, by others) that it is necessary to introduce fresh blood frequently, even each year. It is not at all necessary, in fact is a mistake to do so, if the object is to fix a type or work upon a good laying strain. It is possible, provided, of course, the birds are always kept strong and healthy, to start with two unrelated birds and breed from them and their progeny in direct line for six generations with impunity, which is ample time to fix a type or manufacture an excellent laying strain. But they must be bred in line: sire mated to daughter, grandsire to grand-daughter, dam to son, and so on. This is scientific line breeding, but not brother to sister. This is in-breeding, pure and simple, and results in weak, delicate stock, and no fixity of type.

ARTHUR LITTLE,
Manager.

CEDARA.

RESULTS FOR MONTH OF SEPTEMBER.

(Competition commenced 9th July, 1911.)

No. of Pen.	Owner.	Breed.	No. of Eggs.	Weight. lb.	Weight. oz.	Total No. of Eggs.	Total Weight. lb.	Total Weight. oz.	Position to date.
1	Mr. Greenough	W.L.	45	5	7½	101	12	15½	10th
2	Mr. Doidge	W.W.	46	5	9½	105	12	14½	8th
3	Mr. Firmstone	B.O.	47	5	1½	127	13	11	2nd
4	Mr. Hutt	B.L.	28	2	5	99	9	13½	11th
5	Mr. Mason	W.L.	40	4	3½	81	8	4½	15th
6	Mr. W. F. Chapman	B.O.	47	5	1	128	15	6½	1st
7	Mr. McEwan	W.L.	31	3	11	71	8	12½	17th
8	Mr. Stranack	W.W.	44	4	14	114	13	5½	5th
9	Mr. Dewar	S.W.	40	3	14½	114	11	8	6th
10	Mr. J. J. Mann	W.L.	51	6	4	101	12	11½	9th
11	Mr. Coupland Ferguson	W.W.	52	5	11	122	13	10½	3rd
12	Mr. Guy Blundell	W.L.	61	8	1½	116	15	3½	4th
13	Mr. Woodward	W.L.	53	6	13	73	9	7½	16th
14	Mr. Wilson	B.O.	33	3	15½	88	11	6	12th
15	Mr. Wilson	W.L.	23	2	12	55	6	15½	18th
16	Mr. Wilson	B.M.	31	3	12	85	10	6½	13th
17	Mr. J. J. Mann	W.W.	36	3	12	106	11	7½	7th
18	Mr Hulett	W.L.	33	3	13½	82	9	14	14th

EXPLANATION OF BREEDS:

W.L.—White Leghorns.	B.L.—Black Leghorns.
W.W.—White Wyandottes.	S.W.—Silver Wyandottes.
B.O.—Buff Orpingtons.	B.M.—Black Minorcas.

Correspondence.

This section will be set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture will be particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria", and written on one side of the paper only.

OBSERVATIONS ON LAMZIEKTE.

To the Editor of the *Agricultural Journal.*

Sir,—I am sending you this letter with regard to lamziekte in cattle, hoping that it may be of use.

Whilst farming in Bechuanaland I had a little experience with the disease. The first cases we had were some cows which we had bought from a farmer not far from the farm on which I was at that time. We bought six head, and lost five out of the six from lamziekte. Previous to this our cattle were quite healthy; from then onwards our troubles began. In one season we had seven down, and all fatal cases. These cattle were dosed with epsom salts, but it apparently was of no use. All these cattle had ticks under tail and in ears; they all walked very stiffly in front legs. The acute cases staggered and could only go a few yards and then lay down. Post-mortem examination showed in most cases that the intestines were inflamed, due to impaction of leaf stomach, I suppose. In some cases the lungs were very much discoloured. In other cases everything appeared normal, except leaf stomach, which was hard and dry.

I have noticed that after giving salt to cattle the disease has broken out. Our animals had lots of bone meal, and yet lamziekte appeared. The cattle fed on bone certainly looked better in condition, but otherwise they got the disease just as badly as those which had not had bone meal.

I think a beast has the disease at least a month or six weeks before it staggers. I have noticed that the excrement of an animal which is contracting the disease is of a very dark colour, and has a glutinous substance adhering to it. The joints of the animal affected also creak when walking as in stiff-sickness.

We had a few cows that we fed on mealie meal and mealies, and which were yielding a good supply of milk. They were kraaled at night and fed, and were run on the veld during the day. These cows escaped the disease whilst being fed, and took the disease later when we stopped feeding.

We had some oxen at this time which were working continually. One of these took the disease and died.

One case we had was a cow which went down very suddenly. I had great trouble to get her up to the kraals; she seemed too weak to walk, and it was only by getting a boy to tease her that we at last got her to move. I gave this cow three-quarters of a coffee-cup of stockholm tar and a cup of paraffin, and the second day half as much as first dose. She was so weak that we had to lift her every morning. I fed her on green mealie stalks, and I have noticed that lamziek animals prefer this to other fodder. This cow had a calf a month old, and for two weeks we suckled it to another cow. Eventually it was brought back to its mother, and in a few days her milk supply had returned.

We dosed animals with stockholm tar and paraffin and saved at least ten out of eighteen or twenty head. With epsom salts the result was bad.

We find that the cattle take the disease in low country, where there are pans. The grass or some mineral salts in those pans appear to have a bad effect. All our cattle which had had stiff-sickness and took lamziekte later, died of the acute form from twenty-four to forty-eight hours from time of lying down. We hear that cattle take the disease through eating infected bone. Would it not be well to take the bones of a lamziek animal and give it to a healthy animal and note result? Also try stiff-sick bones on healthy animal.

The disease has always appeared when grass has grown out and then wilted, as it does after a grass fire has gone over the farm.

May it not be well to try stijfziektebosje on a poor animal, and also on a cow heavy in calf? These seem foolish questions, but I have noticed that some seasons it attacks only cows in calf, and at other times cows with calf. I notice that in the experiment carried out with *Crotalaria burkeana* the animals were stabled; if these were run in a paddock during the day and fed at night, may the plant not affect them differently?—i.e. not cause stiff-sickness. Why I mention this is because the dew may make a difference, as on grass or lucerne.

Last year quite a lot of the cattle went lame in shoulder or hind leg, and I noticed that most of these animals took lamziekte two or three months later.—Yours, etc.,

Kareefontein, P.O. Maraisburg. E. KINSLEY.

P.S.—I have noticed a grass which exudes a white froth. May this not have something to do with the disease? These cattle had clean water, of limey nature, which flowed through rank vegetation.

THE RAIN-TREE OF PERU.

To the EDITOR of the *Agricultural Journal.*

SIR,—With regard to your note *re* rain-tree, Professor A. H. Keane, LL.D., F.R.G.S., states:—"A highly characteristic member of the Peruvian vegetable kingdom is the so-called *Tami caspi*, or 'rain-tree', which in the Moyobambo district grows to a height of about 60 feet. It takes its name from the remarkable property which it possesses of absorbing the humidity of the atmosphere in such abundance that the foliage keeps continually dripping, even in the driest weather". (Stanford's Compendium of Geography and Travel; Ed. Sir C. B. Markham, 1909).—Yours, etc.,

Olot, Don-Don, Ladybrand, Orange Free State. JOHN A. NEWBY.

[In the September number of the *Agricultural Journal* of New South Wales, Mr. J. H. Maiden, the Government Botanist of that State, who is a world-renowned authority on matters botanical, has the following note on this same subject:—"This is the same old yarn that we have been trying to knock on the head for a quarter of a century or more. The tree referred to is *Pithecolobium saman.* Its merits as a conserver of moisture in the air are grossly and ridiculously exaggerated. Moreover, it is a strictly tropical tree. For many years we have reared it in hot-houses in the Sydney Botanical Gardens, but although the attempt has been made during at least ten or twelve years, we have never been able to cause it to survive a single Sydney winter." It may be further pointed out, as was stated in the note in the last issue of the *Journal*, that neither the Department of Agriculture at Lima nor the Peruvian Geographical Society know of its existence as a water-conserving tree.—EDITOR, *Agricultural Journal.*]

ERADICATION OF SCAB IN SHEEP AND GOATS.

To the EDITOR of the *Agricultural Journal.*

SIR,—As a student of the above problem for the past eighteen years I was naturally very interested in the resolution passed at Bloemfontein a short time ago by the Free State Farmers' Association, recommending the Government to adopt the block system and simultaneous dipping as the best means for eradicating scab in the flocks of this country. It is sincerely to be hoped that the Government will follow the advice of these Free State farmers, as by so doing the scab disease would soon be a thing of the past.

I was also very pleased to note that the proposal to make the use of lime and sulphur, and caustic soda and sulphur, compulsory throughout South Africa, has now been dropped by responsible farmers, as this proposition is both impossible and unnecessary; impossible, because of the varying conditions prevailing in different parts of the Union and the lack of experience on the part of thousands of farmers with regard to the mixing of these crude compounds; and unnecessary, because it can be proved that many proprietary sheep dips are not only as effective in eradicating scab, but are found vastly superior to either lime and sulphur or caustic soda and sulphur when the effect on the wool and mohair is considered. In this connection the following suggestion was made to the Prime Minister last March, viz., that all manufacturers and importers of sheep dips should be compelled to state on each package of their goods the name or names of the active principles on which they rely, together with the exact percentage contained therein. Each manufacturer and importer should be called upon to lodge with the Government a guarantee of the accuracy of the analyses shown on the packages, and heavy penalties should be enforced if the

Government Analyst should find any variation in the strength which would be detrimental to the interests of the farmer. Every farmer should bring this important matter before his Parliamentary representative, and urge him to do all in his power to alter the law as suggested. If this is done, and the block system and simultaneous dipping are adopted, scab is doomed.—Yours, etc.,

Durban. HONEST TRADER.

SCAB ACT ADMINISTRATION.

To the EDITOR of the *Agricultural Journal.*

SIR,—Will all farmers kindly give their views, through the *Agricultural Journal,* on the following, *re* Scab Act:—

Instead of farmers reporting scab, that the inspectors be authorized to visit each farm once a month, and in cases of scab and the farmer not making efforts to cleanse, then to act.

Now, as the Act stands, a farmer reports scab, the inspector goes out, issues an order to cleanse, which he could do just as well on his monthly rounds.—Yours, etc.,

Esperanza, Colesberg, Cape Province. C. CLEMENTS.

THE DIVINING ROD PROBLEM.

To the EDITOR of the *Agricultural Journal.*

SIR,—Referring to the letter appearing in September *Journal* on the divining rod problem, by Mr. G. B. Newman, will Mr. Newman kindly inform the readers interested in this matter upon what grounds he bases his assertion that the underground waters of this country flow from east to west, and not by any chance from north to south? I am of opinion that the waters run with the formation of the country.

For the last year and a half I have been engaged in blasting a cutting through 15 feet of limestone and dolomite, with the view of cutting off the water, which I have reason to believe runs from north to south of my farm. During my operations I have come across two or three water beds at a depth of 15 feet, and above them I have a stream only 8 feet from surface which appears to flow from the north, but I believe this to be merely an overflow from the main stream which I expect to find at the 15-feet level. For the benefit of those believers of the divining rod, I might state that I have had dozens of water diviners show me where I should find the " aar ", but up to the present none of them have proved correct.—Yours, etc.,

Vogelfontein, P.O. Barkly West, Cape Province. FRANK MAY.

To the EDITOR of the *Agricultural Journal.*

SIR,—I have read with interest, as I always do, a letter on the diviner's forked stick, by Mr. G. B. Newman. He appears to be very sceptical, like many who think the earth is shaped like a pancake, and do not believe in Marconi or X-Rays, and, besides that, appears little acquainted with South Africa, consequently has made several mistakes.

First fallacy: " That there are no dykes running from north to south ". There is a dyke to the west of Loxton running almost due north and south, and is traceable for 15 to 20 miles at least. Another, on Silvery Home, upon which I had a well made, and found water at 25 feet, runs practically north and south. In fact dykes branch from each other, cross each other at all angles and in all directions.

Second fallacy: " That water is only found and stands at the upper side of a dyke ". Now, both the north by south dykes I have cited are double dykes, with clay or lime between them, and come from high ground mountain or plateau, and water is absorbed above and does most certainly run between these dykes to a lower level, where it was found by me and others at various times.

Third fallacy: " That the forked stick should show large quantities of standing water behind or above a dyke, or else it is worthless ". Now, no water-stick diviner claims that the forked stick indicates any but *running* water.

Fourth fallacy: " That a large body of water should cause the stick to injure the holder ". Well, this is no doubt meant for witty ridicule, but ridicule, whether witty or acrimonious, is not argument, and is very illogical.

Fifth fallacy: " That a stick—if the force is some magnetism, electric or other—should act when the circuit is incomplete ".

Sixth fallacy: "That the operator is gifted with some peculiar magnetism". It is held that the force is caused by the water running, and the human is only the sympathetic conductor. Just as copper is a better conductor of electricity than iron, and india-rubber is a non-conductor, so one man may be a better conductor than another. Now, I will tell you a bit of my experience. I was out for a drive with another gentleman, and we drove a long way through a large river valley. Mr. Newman will not argue, I suppose, that no streams of water run underground in separate rivulets down such a valley. Well, as we drove I held a forked stick. We were chatting, and paid no attention to the stick, except that I held it with my arms resting on my knee, and the hands perfectly supported and steady—no risk of tiredness there. The valley was covered with thick bush and mimosa trees, etc. Every now and then I felt the stick move, and said to my companion: "It is moving". We then stopped, and by examination found a distinct trace of extra freshness in the herbage running across the road. This occurred several times, and I am convinced that I did not voluntarily or involuntarily move that stick, for I was not there for the express purpose of finding or testing the water under the ground, but held the stick as I travelled along.

Mr. Wm. Fraser, whose letter I just now notice, commences with a fallacy. It is not a well-known fact that the rod *must* be taken from a plant that grows near water; any pliant, tough plant will do. I will read the article later, I have no time now.—Yours, etc.,

Loxton. A. S. JACKSON, J.P.

To the EDITOR of the *Agricultural Journal.*

SIR,—I cannot help making a few remarks on what Mr. Newman says about dykes and veins in your last issue.

It seems to me, with all due respect to Mr. Newman, that his experience about dykes and "aars" is limited only to the part of the country he lives in. He says that these dykes run east and west, and will never be found running north and south. I can assure him that if he travels by rail from Orange River Station to Capetown he will find many dykes running due north and south for a distance of many miles in the Karoo. That water runs in veins is proved over and over. Water was shown by the divining rod and bored open, delivering 200,000 gallons per day, where no dolomite or conglomerate dykes are to be found for miles around. I quite agree with Mr. Newman that waters are collected behind these dykes, and every sensible man will know that by drilling or sinking a well behind these dykes water will be obtained, without the use of the divining rod. The rod does not work on standing water, and the diviner will be foolish trying to locate water where every one knows is water. But where no dyke or sign of water is seen the rod is used to locate veins independent of dykes, and in hundreds of instances has succeeded in locating the veins. By sinking a well on a vein you will find that as soon as you are in the rock crevices will show themselves as wide as the vein is, which run straight down to the water, whereas the rock coming on to the crevices on both sides slope or dip to the water. These veins run for many miles, even through dykes, but the formation is always the same. And any one using the rod honestly will be able to locate water.—Yours, etc.,

WITNESS.

To the EDITOR of the *Agricultural Journal.*

SIR,—In the September number of your *Journal* I find a letter from one Mr. Newman, which, I think, requires a reply.

He goes strongly against the use of the divining rod, and, as an argument against, tries to make out that very little of the underground water in South Africa runs in veins, but does not give any proof that this is so, as his opinion *re* conglomerate dykes is only a theory.

My experience *re* veins is that only a very small percentage of them come up to the surface as fountains, and I have found dozens of wells on the North American prairies, and have also found water in Europe, and here in South Africa. The rod does not work for me at a depth of over 50 feet unless the vein is very strong, though I dare say there are others who can feel it further down, but when Mr. Newman thinks that we claim it can be found at *any* depth he is quite mistaken.

Mr. Newman's talk about muscle contraction, etc., is all an old argument for which there is no proof. When I go with the rod it does not tire me in the least, and I have sometimes walked for hours with it without feeling it work, and again I have sometimes felt it work as soon as I started. If Mr. Newman wants to satisfy himself about this there is a very easy way to do it. Get hold of a good water-finder, and let him find the course of a vein; then blindfold him and give him the rod, lead him towards the vein, and see results. Don't let him stand on the vein when he starts, as this is confusing, because the rod will work when he goes away from it. If after this it works every time he crosses the line this ought to be proof enough.

It is very easy to be sarcastic about things of which we are ignorant, and I remember I had the same tendency when about thirty-five years ago I had graduated from a technical college, and things did not agree with what I had been taught, but since then I have found that my own experiences are more to be relied upon than theories. As this letter is not an advertisement for myself, and as I don't want to be overhung by people who want me to find water, I sign myself,—Yours, etc.,

Zululand. ZULU.

To the EDITOR of the *Agricultural Journal.*

SIR,—I would be glad to be allowed to give my experience as an amateur with the divining rod. Until a couple of years ago I had no belief whatever in the diviner's wand. I considered everybody who professed to tell where water could be got a humbug. However, I came to alter my opinion after putting down a well ninety feet and getting no water. A gentleman made use of a piece of fencing wire in my presence and told me I had put the well down in the wrong place. I bought a farm in the Heidelberg District about a year ago, and came to occupy it a few months ago. I selected a site for my house in case I could get water near it. I tried a piece of fencing wire about four feet long, and bent in the shape of an A without the cross line, but looped at the top. I walked about in every direction for about an hour where I would have liked to make a well, but the wire made no movement whatever. I went to another part of the farm, and when I first walked over the ground the wire began to move, and turned down at a certain spot. I tried it several times to make certain, and the wire turned down every time at the same place. I then walked several times from the opposite direction, and the wire turned down every time at the same spot as before. I commenced my well on that spot, and have struck water at twenty feet.

I cannot understand how any man with ordinary common sense can so far lose his head as to allow his hands to move or turn the rod down when he does not want them to do so. Perhaps he may have some kind of cramp. I should like some of those gentlemen who can make a stick turn round inside its own bark to explain to me in a sensible way—no silly, absurd nonsense—why the fencing wire did not move in my hands for an hour when I walked over ground where I was most anxious for it to work, and why it did when I walked over ground where I did not want to see it move. Is it possible I suddenly lost my head as some people seem to do when the hands get control of that part of the anatomy? I don't think so. I have faith in the divining rod, and shall never attempt to dig for water without first consulting my piece of fencing wire.—Yours, etc.,

Vaalfontein, Heidelberg District. FARMER.

[This correspondence must now cease.—EDITOR, *Agricultural Journal.*]

FLEECE CAPACITY OF MERINO EWE ON KAROO.

To the EDITOR of the *Agricultural Journal.*

SIR,—Will some expert farmer kindly give the following information? Can a merino ewe carry a fleece of 13 lb., have a good large body, and rear a healthy lamb on our Karoo and also stand drought in lambing time?—Yours, etc.,

Esperanza, Colesberg, Cape Province. C. CLEMENTS.

SPRING-HARE DESTRUCTION.

To the EDITOR of the *Agricultural Journal.*

SIR,—Last year I suffered enormous damage to my mealies through spring-hares. They dig up the young plants as soon as they appear above ground. I think sowing poisoned mealies around the land should be effective, but do not know what to use, so would be glad of advice in the matter. Would mealies boiled in arsenic do, and would they remain deadly long enough after exposure to sun and rain? The lands are too far from my house to permit of shooting or trapping.—Yours, etc.,

Gerhardminnebron, Fredrikstad, Orange Free State. F. J. BLANCKENBURG.

[We would be glad if readers who have been similarly troubled but have coped successfully with this pest would narrate their experiences for the benefit of correspondent and others.—EDITOR, *Agricultural Journal.*]

SOFT EGGS.—MOULTING.

To the EDITOR of the *Agricultural Journal.*

SIR,—Would you kindly give me advice *re* the following :—

When a hen is troubled with a soft egg, what is the best way to get her to pass it? I had one die yesterday in consequence of the egg breaking; she seemed perfectly healthy otherwise. I gave her a pill, also a little olive oil, but it had no effect.

I should also like to hear your opinion on the subject of moulting at this time of the year, some of the fowls losing their feathers. Is there any way of preventing this? It does not appear to affect their laying powers, as one hen has almost her whole neck bare, but continues to lay regularly.

They have plenty of liberty, and get a mixture of hard food, and a couple of times a a week soft food. Thanking you for your attention,—Yours, etc.,

72 Crystal Street, Denver. (MRS.) J. M. GIBSON.

[Correspondent is referred to the article on poultry ailments which appears in the current issue, and which discusses these two points.—EDITOR, *Agricultural Journal.*]

PARAFFIN FOR CHICKEN-POX.

To the EDITOR of the *Agricultural Journal.*

SIR,—I have found paraffin a sure cure for chicken-pox, applied with a feather, and one dose is generally sufficient.—Yours, etc.,

OLD HEN.

ZEBRA HYBRIDS.

To the EDITOR of the *Agricultural Journal.*

SIR,—Will you or any of your readers kindly tell me if a cross between a zebra stallion and donkey mares would be better than a donkey, if they would cross, and to whom I could write for a zebra stallion?

Will a full-grown zebra stallion mix with the donkey mares, or would I have to get a young one and allow him to grow up with the donkeys?

Trusting you will oblige, and thanking you in anticipation,—Yours, etc.,

Villieria. W. C. HOFFMAN.

To the EDITOR of the *Agricultural Journal.*

SIR,—I am taking the pleasure of informing you that a zebra mare and horse stallion have bred a foal. The colour of foal is brown at present, but one can see that when grown it will have stripes. On the shoulders one can see the stripes faintly under the long hair, but on the hindquarters the stripes are darker, and the legs are very much like those of a horse foal. It seems to me that it grows faster than a mule bred by a donkey mare. The foal is a stallion.

I inform you for the reason that I hear it is the first instance in this country of a zebra mare throwing a foal by a horse stallion.—Yours, etc.,

Private Bag, Papzella Knob. Location,
Klein Spelonken, via Pietersburg. M. W. ASH.

GAL-LAMZIEKTE.

To the EDITOR of the *Agricultural Journal.*

SIR,—As Mr. J. F. Dugmore has not given his full address I am unable to write to him direct. I would like to know has Mr. Dugmore ever tried Cooper's (powder) dip and salt, 1 in 10, for what we call "gal-lamziekte", as a preventive? I will be much obliged if will answer this query. I have been dosing my cattle every three months with this dose—one heaped-up tablespoonful to big cattle—and think it has helped a lot. I think one should dose every two months, as three months is rather too long a period, and the effect wears off. I have found the disease worse in cows or heifers *heavy* in calf. Although my farm has dense bush a cold rain seems to aid the sickness. Now a friend of mine in Vryburg says it is worse in cows that *have just calved*, from fourteen to twenty-one days. I always thought cows in milk immune, as they cannot accumulate milk and bile. Two of Mr. Dugmore's remedies, viz., chicory and vinegar, are good for gallsickness, and are also used for goats when troubled with this disease. Some little time back a neighbour of mine moved

goats from poor dry veld to good bush veld. About ten days after they started dying, and I advised a dose of Cooper's and salt; only a couple died after being dosed.

I would like to send Dr. Theiler a few ticks taken from my cattle, and would like to hear his report on same; will forward them as soon as I receive full particulars from him. Does Dr. Theiler think the Cooper's and salt of any use, and if so for how long does he think the remedy would be a preventive? In Vryburg they are now trying pure bluestone and salt, 1 in 10, I hear, and with good results. I have always noticed when cattle start growing, and, as I have thought, accumulated gall, that is the time they go off. I have also used bone meal and salt, but I cannot say with good results.—Yours, etc.,

Spitzkop, P.O. Box 86, Graaff-Reinet, Cape Province. DOUGLAS EDWARDS.

BRANDING WOOL BALES.

To the EDITOR of the *Agricultural Journal.*

SIR,—In reading through your splendid *Agricultural Journal* I came across an interesting article headed " Branding Wool Bales ", and as there appears to have been some controversy on the subject, I would like to give you my little quota on it too.

Having been for years on sheep stations in Queensland, principally for a firm quoted in your article, namely, Dalgety & Co., and having been a shearer rousabout to the exalted position of " boss over the board ", I have experienced the working of wool from the paddocks to the carrier's wagon, with the exception of classing the clip, and the *modus operandi* is as follows :—

Every sheep that is shorn in the shed, the fleece is picked up and carried to the wool table to be rolled and skirted; from there it is taken to the classer's table to be classed; when it is classed it is placed in the bin set apart for its class, from first combing to third, and from first clothing to third, down to dags and stained pieces; from the classed wool bins it is carried to the press; the pressers (who are generally contractors) are advised by the classer which to keep clear, and the wool is pressed, as near as possible, to 3½ cwts.; when it comes from the press it is sewed by one of the pressers, and is then handed over to the man who is employed as bale brander and weigher; his duties are to weigh all bales and brand them, enter them in a book kept by the station for that purpose.

In all cases during my many years of station experience all stations generally followed the same routine, and on the last station I was employed on as overseer, this is the way the bales were branded :—

Name of Firm....................	Dalgety & Co.
Name of Station..................	Maneroo.
Class............................	First Combing.
Sex..............................	W. Hoggetts.
Weight...........................	3–2–11.
Number...........................	192.

This would have to be placed on two sides, opposite, and the bottom of every bale, and is done with stencils, with lampblack and oil, and a small brush. One man can keep clear of sixty shearers, averaging 6500 sheep a day, keeping his book and all.

If this is any use to you please print in your next.—Yours, etc.,

Pietermaritzburg, Natal. EMU PLUME.

REMEDY FOR PEACH FLY.

To the EDITOR of the *Agricultural Journal.*

SIR,—I notice in the current number of the *Agricultural Journal* requests for a means of destroying the green fly pest on peach trees. As I have been very successful in keeping my peach trees free from green fly this year, it may interest you and your readers to know how this end was attained.

Just before the buds began to swell I thoroughly sprayed the trees with the well-known lime and sulphur solution. Then I waited until the blossoms fell, and sprayed with extract of tobacco. I sprayed three or four times a week, waging incessant warfare against the pest. The result is that to-day my trees are beautifully clean and full of fruit, and I am well rewarded for my trouble. Most peach trees near my orchard are at present absolutely bare of fruit, owing to the ravages of the green fly pest.—Yours, etc.,

P.O. Box 174, Johannesburg. A. HOLLOWAY.

OLIVE TREES AT THE CAPE.

To the EDITOR of the *Agricultural Journal.*

SIR,—In an article on the above subject in the current *Agricultural Journal,* I read :—

" The climate and conditions prevailing along the southern littoral border of the Cape are so admirably suited to the growth and cultivation of the olive that one wonders why the culture of this fruit did not engage the attention of our early settlers in the same way as the vine, especially since many of these people came from a country where the olive has been cultivated for profit for ages past."

I also read in Mr. Theal's " History of South Africa ", Part III, page 126 (English edition) :—

" When Mr. Van Riebeek left South Africa he anticipated great profit from the cultivation of a particular plant. That plant was the olive. Nowhere in the world could there be a finer specimen of the young olive tree than on the farm which had once been his. In the preceding year it had been overloaded with fruit, which had ripened well, and now he had hundreds of young trees ready for transplanting in July and August. Yet to the present day it is an open question whether the olive can be cultivated with profit in South Africa."

This shows that 250 years ago Mr. Van Riebeek tried to inaugurate the cultivation of olives in South Africa. Further, I can communicate to you that at the Paarl (Cape) you can find a plantation of olives planted twenty-five years ago which has given a nice profit to the owner.

The reasons why Mr. Van Riebeek's experiment was not followed up are probably:—

(1) His immediate successors did not care very much for agriculture ;
(2) the directors of the Dutch East India Company did not want olive oil for their ships coming from or going to East India ;
(3) the Huguenots, who introduced viticulture in South Africa, had no knowledge of the olive tree, which thrives in France only along the coast belt of the Mediterranean, and immigrants of Spain and Italy have not found their way to the shores of South Africa.—Yours, etc.,

JAC. VAN BELKUM.

SCAB AND ITS TREATMENT.—MR. R. WARREN AND HIS CRITICS.

To the EDITOR of the *Agricultural Journal.*

SIR,—I am pleased to see that my letter, published in the August number of your *Journal,* has led up to some correspondence, as this was my object in writing.

In reply to Mr. W. T. Elliott's letter I wish to say that if a kraal or paddock can be thoroughly cleansed, by all means do it ; but I hold that, except by burning, it cannot be done. In these districts, Kingwilliamstown, Stutterheim, Cathcart, and Komgha, scab was very prevalent previous to an effective Scab Act coming into force in 1887. In a very few years these districts were all clean. They were far too heavily stocked to allow of sheep being removed from infected to clean pasture. They were dipped thoroughly, as we understood our work, some of us using brewers' thermometers to test the heat of the dip—blood-heat being preferred. Sheep after dipping were returned to their own camps and lay places, and where the farms were not fenced to their own kraals. Yet we eradicated scab, and every outbreak within the last twenty years has been traceable to sheep introduced from other districts, where the dipping process has been less thoroughly understood or imperfectly performed.

Mr. Davison's paper proves conclusively that the scab *acari* will live in an old kraal for three years ; if in a kraal why not in a lay place ?

I have never had to dip my sheep three times, but even if three dippings were necessary to cleanse sheep on an infected farm, would it not be worth while doing it ?

The only point I need take notice of in Mr. G. Ingram's letter is his query as to what is meant by the words " fairly clean ". Those words were used in connection with sheep travelling from summer to winter grazing, and the return journey in spring, and were intended to mean no *visible scab,* for it was impossible to say in those days—when there was no Scab Act, and very few farms were fenced—that any flock of sheep were positively free from scab. I claim to know what I am writing about, and hold that the country will never be cleansed of scab by enclosing old lay places or kraals. Burning cannot always be successfully carried out, and if it could why should valuable manure be wasted ?—Yours, etc.,

R WARREN.

CARRYING WATER OVER A RIVER.

To the EDITOR of the *Agricultural Journal*.

SIR,—With reference to " Questioner's " inquiry in the September issue of your *Journal*, as to the best way to bring water across a river, the following will perhaps be of use to many interested persons. " Questioner " will be able to carry out my plan the more easily because his river is not wide.

If there is sufficient depth of soil " Questioner " should fix with concrete, to a depth of five feet, say, six sneezewood posts on both banks of the river, in such a way as to leave one foot above the soil. He should then stretch five or six wires, No. 9 thickness, tightly from the one post to the other across the river. A plank should then be placed over the wires and fastened in the middle of the river. The connection is now of a sufficient strength to allow of the erection of a galvanized iron bridge, which will hold your supply of water and be immovably strong. Another method would be to first construct the bridge on the smooth ground, and then to push it on to the bridge when completed.—Yours, etc.,

Zeekoegat, Britstown. A. S. JOUBERT.

ROOIBLOEM OR WITCHWEED.

To the EDITOR of the *Agricultural Journal*.

SIR,—In view of the experiments being carried on with the rooibloem or witchweed, I should like to give my experience. I had about three acres under mealies; after the second year I found the weed so bad that it was useless sowing mealies again. The following year I ploughed the ground over, sowing nothing. The next two years I planted monkey nuts, which I kept fairly clean. There was no sign of the weed then, so I divided the land into three equal portions. On the first I put sunflowers, on the next mealies, and on the next Kaffir underground beans. I kept the two latter fairly free of weeds, but let the sunflowers take their chance. The mealies grew well to about two feet high, when they turned yellow and began drying up, though there was as yet no sign of the weed, it only showing above ground when the mealies were flowering. I reaped a bag of mealies from the acre. There were no witchweeds amongst the beans, but a good many in the sunflowers, which they did not seem to affect.

Another land nearer the river had all the surface soil washed away with the flood, it having just been ploughed, in spite of which half the mealies were killed with the weed last year. As to eradicating the weed, I do not see how it is to be done, as it grows all over the veld about here. The only thing is to sow crops it does not affect, such as sunflowers, beans, etc.—Yours, etc.,

Belmont, Pyramid. F. P. CARLISLE.

Questions and Answers.

These pages will be devoted to questions, and an endeavour made to reply to all inquiries upon agricultural topics of general interest, or concerning any of the articles published from time to time in the *Journal*. In all cases replies will be posted to correspondents so soon as same have been procured.

Correspondents are requested to write on one side of the paper only. No manuscript will be returned.

All letters must be addressed to the Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria.

FERTILIZERS FOR WHEAT AND MAIZE.

F. C. van der Merwe, De Grootboom, Buffelsvlei, via Lydenburg, Transvaal, writes:—You will oblige me by giving me some information regarding fertilizers suitable for wheat and mealies. My lands consist partly of red turf-soil and light-yellow sand, and they are rather poor. Can you recommend me the right kind of manure, that which has the most lasting effect in the soil? How must I apply it? Where can I get it and what is the best and quickest way to obtain it? How much will it cost to manure 10 morgen?

Answer.—The Division of Chemistry replied:—The principal fertilizers for the cultivation of wheat and mealies on your soil are manures containing phosphates and nitrogen.

Manures containing phosphates.—These include:—

(*a*) *Superphosphates.*—This is a manure of rapid action. Generally 400 lb. of high-grade superphosphates is applied per morgen, containing not less than 16 per cent. phosphoric oxide (equal to 35 per cent. of phosphate of lime) soluble in water. The ordinary strength which is being sold is 37 per cent. soluble phosphate of lime (equal to 17 per cent. phosphoric oxide). The general price is about £4. 10s. per ton at the coast.

(*b*) *Basic Slag.*—This is a fertilizer which is slower in its action than superphosphates, but it contains much lime, and is for that reason more suitable for your soil. As a rule 800 lb. are applied per morgen, but the effect is much more lasting than the above recommended superphosphates. Basic slag should not contain less than about 16 per cent. phosphoric oxide (equal to 35 per cent. phosphate of lime). A 20 per cent. basic slag is also obtainable (equal to 43½ per cent. of phosphate of lime), and I recommend this strongly. I consider it to be the best obtainable quality. The price is about £4. 10s. per ton at the coast; the lower grade containing 16 per cent. phosphoric oxide costs about £3. 15s. per ton at the coast.

(*c*) *Bone-meal.*—This is a very useful fertilizer and contains both phosphate and nitrogen. Ground bone-meal is the best and can be obtained at the factory at £6. 15s. per ton. Generally from 700 lb. to 800 lb. is applied per morgen. The effect of this fertilizer is also lasting, the action being rather slow.

Nitrogen-containing Manures:—

(*a*) *Kraal Manure.*—This is the best nitrogen-containing manure and is also most in use, but is very varying in quality. Fresh manure contains much more nitrogen than the same manure after it has been kept for some months. The only drawback against the use of fresh manure is that it brings weeds upon the lands. I, however, hold that the labour entailed by using it is amply compensated for by the value of the material. As a rule it is used for cultivating tuber crops (such as mangels, potatoes, and rapes), which can be kept free of weeds, but the same also applies to mealies. Old kraal-manure is far poorer in nitrogen and richer in phosphates and potash. When using this a quantity of from 5 to 10 tons per morgen is to be recommended, and in addition half the ordinary amount of phosphate.

(*b*) *Nitrate of Soda.*—This manure is not to be recommended for the cultivation of mealies, it being rather expensive, but it has no effect upon mangels, potatoes, and possibly also winter crops, such as wheat and oats. It costs about £12. 10s. at the coast. Generally 200 lb. per morgen is applied.

The cheapest and most suitable method for enriching the soil in nitrogen, especially on dry lands, is the cultivation of beans or pea nuts, which have the property of fixing the nitrogen from the air in the soil. I would therefore advise you to cultivate these crops from time to time. One of the best crops for this purpose are velvet beans, but kaffir beans and pea nuts would also do. They also form an excellent cattle food, and are preferable to oats and mealie-stalks. The best fertilizer in conjunction with these crops is basic slag. These fertilizers may be either sown in great quantities by hand or by means of a fertilizer drill.

It would cost about £14 to manure 10 morgen of land with superphosphate in the above recommended quantity, and with basic slag in the recommended amount about £27, but the effect would be much more lasting, and it need be applied only once in every three years. The cost of manuring the above piece of land now that the reduction of railway rates has taken place is much lower, being about £11 for the superphosphates and £20 for the basic slag. Importing the manure direct—and so avoiding the manure merchant's charges—the cost would be about £8 and £15 respectively.

MANURING LUCERNE.

S. A. Theron, Wittedrift, Knysna, Cape Province, asks for advice in regard to the manuring of lucerne.

The Acting Government Agriculturist (Cape) replied:—Our best results in Karroo soils have been obtained from a dressing of 650 lb. superphosphate per acre. In Mr. Theron's part of the country, which is sour veld, however, the use of basic slag is recommended instead of superphosphates, the quantity to be applied being at the rate of 650 lb. per acre.

HARVESTING LUCERNE.

Replying to a request from C. F. Basson, Weltevreden No. 116, P.O. Jacobsdal, Marico, for advice in connection with the harvesting of lucerne, the General Manager of the Experiment Farm, Potchefstroom, writes: Lucerne should be mown when the first few blooms appear in the field. It should not be left until the majority of the plants are in bloom. If cut just before blooming hay of better quality can be made, and the leaves will not drop off so much. If the crop lies thick on the land turn it over once or twice in order to get it thoroughly dry as quickly as possible. After the hay is half dried, and before it is ready for removing from the field, it is advisable to gather it together and make little heaps of it, about 6 feet wide across the bottom, about 3 feet high, and rounded over the top like a kaffir hut. This prevents the hay being discoloured with rain or heavy dew to a large extent. Next morning these heaps should be spread out with forks if the weather is favourable. As soon as the "hay" feels dry to the touch, rustles a little in handling, and when the stems are also dry, it is fit for either baling or stacking.

COTTON.

G. J. Smit, Bokfontein No. 647, P.O. Brits Station, Rustenburg, writes: I shall be very glad if you will be kind enough to supply me with details in connection with cotton planting as a possible produce on a farm in this district. I should be very grateful for any special information with regard to the mode of planting the seeds, the best distance between the seeds, watering, and the most approved kinds of seeds, harvesting, etc.

Answer.—The Chief of the Tobacco and Cotton Division replied:—(1) Cotton should be planted with the first spring rains, say, from the middle of October to not later than the middle of November. If planted later the crop often fails to mature. Harvesting begins when the bolls are fully open, about the latter part of April to the beginning of May, and is continued until the whole of the crop is harvested. (2) The seed should be sown in drills 4 feet apart, covered to a depth of about 2 inches, and when the young plants are about 6 inches high thin or "chop out" to from 18 to 24 inches between plants. Cultivate as you would mealies, but cultivation should cease when the squares for the flowers begin to form. (3) Maturity in cotton is indicated by the bolls bursting

and exposing the seed-cotton, and when the cotton is fully ripe the fibres will be found to take on a spiral twist which is not apparent when the bolls are immature. By the time the first picking is finished more bolls will have opened on the plants first picked, and harvesting is continued until all the seed cotton has been removed from the plants. Usually three pickings are necessary. Cotton should not be picked when wet from rain or dew. When all the cotton has been harvested it is passed through a gin, which separates the seed from the lint, the latter being then pressed in bales and transported to market. (4) Cotton can be successfully grown on dry lands where the rainfall is 25 inches or more per annum, provided, of course, no long periods of drought are experienced. Lands producing mealies will also produce a good cotton crop. Cotton will thrive on a variety of soils, among which are turf, red and chocolate loams, medium clay loams, and all soils grading into these. The safest soils for the crop are medium grades of loam. (5) An average crop of cotton should be not less than 600 lb. of lint per morgen, and 800 lb. of lint per morgen would not be considered unusual. (6) Cotton is very susceptible to frost, but by planting in October the plants should be so far matured by May that frost will not do much damage.

WHEAT FOR NATAL COAST LANDS.

A. H. West, Phoenix, Natal, asks:—Will you be good enough to inform me whether there is a variety of wheat which will thrive moderately well on the coast lands of Natal? The land where we wish to grow wheat is about eight miles from the sea and about 400 to 500 feet high.

Answer.—The Director of the Division of Agriculture (Natal) replied:—The climatic conditions of the Natal coast do not, in our opinion, afford the environment required by a good milling wheat, though with autumn planting and winter irrigation it might be possible to obtain a satisfactory stand of such types as the barley-wheat (*Hordeum nudum*), or of certain types of durum, or macaroni wheat. The former is botanically a naked or hull-less barley, grown in India and the Mediterranean areas for bread-making purposes, but it is not a favourite with millers on account of its flinty nature. Durum wheats are employed in the preparation of macaroni and other edible pastes rather than for the manufacture of flour. It may be added that the barley-wheat affords an excellent forage crop. Correspondent is referred, for further information, to the article on the Prospects for Wheat Culture in Natal appearing in the current issue.

FERTILIZER FOR SOYA BEANS.

Replying to an inquiry from W. H. Turner, P.O. Box 57, Springs, Transvaal, asking for advice as to the best fertilizer to use for soya beans, the General Manager of the Experiment Farm, Potchefstroom, writes:—I am not aware of any definite experiments having been made upon the manuring of this crop, and in any case definite advice cannot be given upon the most suitable manure for particular soils without an intimate knowledge of them. But I am of opinion that it is likely that about 250 lb. per acre of high-grade superphosphate will give the best results.

COLD STORAGE OF SEED POTATOES.

In reply to an inquiry from W. H. Turner, P.O. Box 57, Springs, Transvaal, asking the correct temperature to store seed potatoes in cold storage, the Manager of the Government Cold Stores, Pietermaritzburg, writes:—The correct temperature for seed potatoes in cold storage is 34° to 36° F., and the room should have a free circulation of dry air. Large quantities of seed potatoes are stored here in temperatures varying from 33° to 37° F., and these after five or six months in storage turn out in excellent condition for planting. The greatest care should be taken to see that potatoes intended for storage are dry and firm, and that the sacks or cases (the latter are preferable) do not contain any unsound potatoes, soil, or other matter. The presence of sprouts up to an inch in length does not render seed potatoes unfit for storage, as growth is simply retarded at the above-mentioned temperatures.

MAIZE SAMPLE.

T. Ramadge, Glongowna, Holfontein, Orange Free State, writes:—In your September number I observe a letter from my friend Mr. G. F. Serfontein *re* yellow mealies, and under separate cover forward three ears (two red cob and one white) which are probably the same as or similar to that forwarded by him. I have grown this mealie for five seasons now, and have harvested regularly about double the crop per acre of this mealie as that from Hickory King, which has given such a poor return on my farm that I am not going to sow it again. I find this mealie a good drought-resister, but cannot agree that either it or any other mealie is in any degree hardy against foul lands and bad treatment. In about 95 per cent. of cases the cob of the mealie is white. Is there any advantage in breeding it to a pure red cob?

Answer.—The Government Botanist (Transvaal) replied:—The ears sent are those of a yellow flint somewhat crossed with white, and carrying twelve to sixteen rows. It is a promising type to breed from. The ears are too tapering, and it would be best to select your seed ears from those having the base rather less swollen. It is desirable to have red cobs for yellow maize, as this improves the appearance of the grain in the sack; by selecting for seed those having the darker red cobs, and rigorously excluding *all* white cobs, you can eventually fix the red-cob type.

TOOWOOMBA CANARY GRASS.

W. J. Moore, Grasplaats, P.O. Sandfontein, District Frankfort, writes: I had a small packet of Toowoomba Canary Grass given to me last March and was told to sow it in my garden, and when large enough to transplant to the land on which I wish to grow it. I sowed it about the middle of March in drills about 8 inches apart. It came up well and grew all through the winter without water, and is now thick and stands from 4 to 7 inches high. What I want to know is how far apart must I plant the shoots or roots, and whether I could divide some of the strongest roots, as I would like to have as large an area of the grass as is possible. Also will it require cultivating after it becomes established or will it make a turf like the English grasses?

Answer.—The Government Botanist (Transvaal) replied:—The plants can be planted out about 2 feet apart, but not until the first good rains. Each stool can be divided into a large number of plants provided each piece has a bit of root attached. *Phalaris bulbosa* is not likely to form a solid mat like an English turf. It is desirable to cultivate the ground well between the rows. This grass requires lots of manure and water to give best results.

ARSENITE OF SODA FOR KEDS ON SHEEP.

W. F. Hall, Springvale, Cathcart, Cape Province, asks:—Would you be so good as to forward me particulars of a good dip (arsenite of soda preferred) for keds on sheep. My sheep are alive with them, and I wish to dip them as soon as shorn next month. I presume the kraals will be infested. How would you advise destroying the insects? If the sheep were put into clean kraals how long would it be before the old kraals would be free from keds?

Answer.—The Veterinary Division replied:—Arsenical solutions are most effective for killing these skin parasites. Arsenite of soda in the proportion of 2 lb. to every 100 gallons of water is recommended, or preferably the laboratory dip, viz., arsenite of soda, 8lb.; soft soap, 5½ lb.; paraffin, 2 gallons; water, 400 gallons. Dissolve the soap in about 5 gallons of hot water; while still hot add the soap in small quantities at a time to the paraffin, and beat or stir to a creamy lather. This makes the soap emulsion. Dissolve the 8 lb. of arsenite of soda in two gallons of hot water and when completely dissolved add cold water to make 50 gallons; the soap solution can then be gradually added, stirring thoroughly the while, then sufficient water is to be added to make 400 gallons of the mixture. The sheep ked or horse-fly is really a fly without wings, and not a tick, and it passes the whole of its life on the sheep and does not quit its host. Consequently they do not infect the kraals, but it is said they are capable of living some considerable time in the shorn fleece. Two dippings are really necessary, with an interval of a month or so, to kill those that have hatched from the puparia in the interval. This

family of flies bring forth their young as puparia, i.e. the maggot lives and feeds inside the abdomen of the female fly until it is full grown, then it forms a kind of roundish white or yellowish case which is deposited by the fly on the skin, and after passing through the pupa or chrysalis stage emerges as a fly—the ked.

OSTRICHES.—LAMENESS AFTER CASTRATION.

R. W. Elliott, Bathurst Station, Cape Province, writes:—On Wednesday last I castrated five ostrich cocks. On releasing one of them the long toe was notice to be doubled back and the bird could not walk, nor has it been able to rise since. The others kept all right till Friday night, when we had rain. On Saturday morning another could not rise, from the same cause. These are not the first birds I have castrated, and are the only ones that have been affected in this way. Can you suggest the cause of the trouble? I feel sure, from the second case, that they were not hurt in the handling. They are affected in the left foot. There is no swelling in joint to indicate sprain.

Answer.—The Lecturer in Veterinary Science, Grootfontein School of Agriculture, replied:—I do not think that the conditions described could be due to anything but injury in casting the birds. It would be almost impossible to produce them by the operation itself, or its after results. It is probable that on making a post-mortem on the birds (should they not recover) an injury to the head of the femur will be discovered. On sour veld where bone-forming material is deficient, accidents of this kind occur very easily.

WART ON HORSE'S LEG.

R. C. Brown, Bergville, Natal, writes:—Can any one tell me how to get rid of a wart on a horse's leg? The wart is low down on the fetlock and is flat shaped.

Answer.—The Veterinary Division replied:—I would suggest you make up an ointment composed of half a drachm of arsenic and half an ounce of vaseline. Rub a little of this over the wart once a day for a week or ten days, when the wart should fall out. Do not let any of the ointment get on to the sound skin, as it will burn it.

WARTS ON HEIFERS.

R. A. Taylor, Bussey Buildings, 91 Commissioner Street, Johannesburg, writes *re* above:—I have found common treacle (not golden syrup) put on daily with a suitable brush a good remedy. These warts discharge a pus which I believe get on the grass and so infects other beasts. I have had several animals in a sorry plight at one time, but never had to destroy a beast.

BLACK WATTLES.—GUM EXUDATION.

R. T. Parkins, Eshowe, Zululand, asks:—Can you give me any information as to the cause of black wattles bleeding and the trees dying from it; also is there any preventive? Trees of four years old begin near the roots and bleed gum, gradually dying right to the top.

Answer.—The Plant Pathologist replied:—The trouble appears to be due to some physiological disturbance in the tree at a period of vigorous growth. Until the disease has been studied more closely it is almost impossible to suggest the primary cause of the phenomenon; in fact, it is more than probable that the gumming of wattles may be brought about by several distinct agencies. I am informed by many of the largest wattle growers in Natal that it occurs commonly in certain areas amongst young trees, but that they eventually grow out of it.

TREATMENT OF NON-BEARING ORANGE TREES.

G. H. Whitlock, Loskop, District Boshoff, Orange Free State, writes: Could you give me a little advice as to the treatment of non-bearing orange trees? I have about one hundred and twenty orange trees, some of which are

old bearing trees, from which I have been having excellent crops, and they are again laden with blossoms. About forty trees, all grafted, were planted from tins four years ago last August. These do not seem to come to blossom at all, and only appear to thrive in branching. They are from eight to nine feet in height. They get exactly the same treatment as all my other trees as regards manuring, watering, etc., and they are also well sheltered from frost and cold winds, etc. The soil is from 15 to 20 feet deep. I also planted twenty more orange trees 3 feet in height, from tins, last January; these are laden with blossoms now. My trees are all in one block.

Answer.—The Acting Government Horticulturist (Transvaal) replied:—It is rather difficult to state what would be the cause of these trees not bearing. Possibly the trees were some oldish ones which had become root-bound and are not making a healthy growth. There were many trees sent out from some of the nurseries which had been grown far too long in tins or even in the ground. If they are allowed to remain in one position I doubt whether any of them will ever be worth calling trees. As for the others which were planted only last January and are loaded with blossoms, it is not advisable to allow the trees to fruit so soon after planting. This has a tendency to dwarf the trees. If, on the other hand, the other trees are growing strong, I should be inclined to think that they were not grafted at all but were seedlings, in which case they would not come to bear so soon. Of course it is impossible for me to tell whether Mr. Whitlock has received seedlings or grafted trees. The grafted tree frequently takes four years before bearing fruit, the seedling takes from nine to ten. There are no means by which to force those trees to come to blossom. They take their own time.

PERSIMMONS.—STOCKS: CLIMATE.

A. W. Louw, P.O. Warrenton, Cape Province, asks for information on the following points:—(1) The stock on which a persimmon tree should be grafted; (2) whether the persimmon will thrive in the same climate as the peach; (3) if the tree grows a long while before it begins to bear.

Answer.—The Acting Government Horticulturist (Transvaal) replied: (1) The stock on which a persimmon should be grafted is the Virginian persimmon (*Diospyros virginianum*). (2) It will thrive in most positions, but prefers a sandy loam, will stand great heat, and is not affected by cold winters. (3) It is slow of growth and slow coming to bearing. It is a difficult tree to transplant, the stock making very few fibrous roots.

PROTECTING FRUIT BLOSSOMS AGAINST FROST.

J. J. van Tonder, Vogelfontein, District Rouxville, Orange Free State, writes:—I shall be glad to know whether any means have been discovered whereby frost can be prevented from touching fruit blossoms?

Answer.—The Acting Government Horticulturist (Transvaal) replied: The only means of preventing frosting of the blossoms is by raising the temperature of the orchard by burning smudge fires. This is largely done in Florida and California. Smudge fires are mostly made by burning some material such as coal slack and tar, or, in some cases, petroleum. They can also be made by burning damp wood and rubbish. These fires should be lighted as soon as the temperature drops to 28 degrees.

HEN LAYING SMALL EGG.

H. N. Moffat, Bulawayo, writes:—One of my hens, no particular breed, has for the past three weeks been laying fairly regularly a small egg, about the size of a pigeon's, without any yolk. Should I put her in the pot, or is this only temporary? She has not laid at all the last few days, and it looks as if she has now "gone off" laying.

Answer.—The Poultry Expert replied:—Your experience is rather an unusual one, for though it is quite common for a fowl to lay an egg such as you describe at the end of a batch, it is very unusual for her to continue doing so. I think that it is probably due to the bird being too fat and over stimulation. Try to get her condition down and I think that you will find that when she starts laying again the eggs will be normal; if not, then you had better get rid of her.

VARIATIONS IN BUTTER-FAT YIELDS.

Jno. Ward, Hillside, P.O. New Amalfi, Griqualand East, writes:—Many people in this district are now selling cream on the basis of the amount of butter-fat which it contains. The quantity of butter-fat appears to vary somewhat, even when the conditions of pasturage, milking, and separating are kept as regular as possible; and to settle a controversy I write to ask whether this is avoidable, and within what limits such variation may be reasonably looked for. To put it more clearly, what would you consider an excessive variation in the quantity of butter-fat, when the conditions are about the same?

Answer.—The Acting Superintendent of Dairying replied:—There will always be variations in the amount of butter-fat, notwithstanding the fact of the conditions of pasturage, etc., being kept as regular as possible. The percentage of butter-fat will vary during the day, during the milking season, by reason of the individuality of the cow, the state of the lactation period, weather conditions, and various feeds, and the change from one feed to another. As you will see from the above, variations in the yield of butter-fat cannot be avoided, although the yield can be kept pretty constant by treating the animals as well as possible in all conditions, paying due regard to the factors influencing the yield in butter-fat as stated above. As regards excessive variations in butter-fat, there should not, for short periods, be more than 0.5. For longer periods, say for six months or for a lactation period, the variations may be slightly higher. If you have conveniences for testing the milk of your cows you will notice these variations, and the taking of these tests is highly recommended, as they form the basis for arriving at a decision as to which cows are the most profitable to keep.

CREAM DELAYING IN FORMING BUTTER.

S. J. Beavis, P.O. Box 142, Middelburg, Transvaal, asks:—What is the cause of cream not turning to butter? The cream is from the milk of a poll cow which calved in July, and, I believe, has since been served. I have made butter from the cream during the first two and a half months, except during every third week, when it is an absolute impossibility.

Answer.—The Acting Superintendent of Dairying replied:—Your cream appears to be occasionally suffering from what is usually termed "sleepiness". "Sleepy cream" is a term usually applied when cream fails to yield up its butter, or only does so with great difficulty. There are various causes which may produce sleepiness in cream, and the following are some of the principal: (1) Too low or too high a temperature; (2) improperly ripened cream; (3) too thick or too thin cream (if the former thin down with a little cold water, if the latter churn at a higher temperature); (4) failing to ventilate churn during churning, and over filling churn: no churn should be more than half full; (5) cream obtained from cows during the end of lactation, especially when churning the cream from an individual cow; (6) unsuitable winter feeding: sudden change of diet, such as turning cows out on to spring grass after being used to stall feeding. Without investigation on the spot it is difficult to say exactly what is occasionally causing your cream to become unchurnable. On the next occasion when you find it impossible to produce any butter from your cream you might try removing such cream from your churn, scalding it to 160° F., and after cooling down adding a little sour butter-milk, leaving the cream for a few hours before churning. This treatment sometimes has the desired effect when everything else fails.

A GOOD BUTTER YIELD.

Mrs. McEntel, Gibbon Street, Uitenhage, writes:—My Jersey cow, "Ruby", is 120 days in milk. She is now giving twenty bottles daily, and from every eight bottles of milk I get 1 lb. of splendid butter. I am writing to ask you if you consider this good butter production.

Answer.—The Acting Superintendent of Dairying replied:—The butter production of your cow is excellent, as it takes a very good cow indeed to produce 1 lb. of butter from less than 1¼ gallons of milk. The heifers reared from such a cow should be well worth keeping.

YELLOW TULIP.

A. Neilson, Phoenix Hotel, Bloemfontein, asks:—Could you kindly inform me as to the best way of dealing with the yellow tulip. I have a field which was turned over before the winter; now it is covered with the tulip; and on fields which have been ploughed since the winter they are also starting to come up. I may also state that the veld in this district is pretty well covered by them. Will they do harm to crops (mealies or potatoes) by depriving them of nourishment; also, are they poisonous to stock?

Answer.—The Acting Under-Secretary for Agriculture, Bloemfontein, replied:—This plant comes up abundantly particularly in sandy soils during the spring season. It is a poisonous weed but is rarely eaten by stock. In cultivated lands tulip may be kept down before the crop of potatoes or maize is planted by means of the disc harrow. With the discs set at a considerable angle, the slender stems of the plants are readily cut off. In the growing crop cultivation with a horse hoe is necessary to keep it down. Like other weeds this is injurious to crops, robbing them of moisture and plant food, and effort should be made to eradicate it. No practical means can be suggested for cleaning tulip out of the veld unless the ground be broken up.

BEET GROWING FOR SUGAR.

Thos. G. Dennison, Petrusburg, Orange Free State, writes:—Many of my friends in the Free State have lately discussed the question of growing beet for sugar. We will be glad of any information on the subject, with particular regard to the following points:—(1) What class of root is required? (2) Possibilities of successful cultivation in the Free State; (3) method of planting; (4) volume of sugar from a ton of beet; (5) approximate cost of refinery.

Answer.—The General Manager of the Experiment Farm, Potchefstroom, replied:—The experiments conducted on this farm have shown that the crop can be successfully grown, and that it is of very high quality, i.e. from 16 to 18 per cent. sugar content. But it is one which in the absence of irrigation requires a good rainfall, and a climate not addicted to prolonged droughts. From my knowledge of the Orange Free State I do not think that the crop is likely to be grown successfully without irrigation, except in the eastern parts of the Province. The crop is managed in the same way as mangels, with the exception that the plants should be left closer in the rows. With the information at present at our disposal I do not think that the time is ripe for the establishment of the industry, nor are the conditions favourable, for the following reasons:—(1) An enormous expenditure is involved in establishing the factory, probably £50,000 or more; (2) the guarantee of a crop of from 2000 to 3000 acres in the immediate neighbourhood of the factory would be necessary; (3) it is a risky crop in droughty conditions; (4) on irrigated land other crops are likely to be more profitable and involve less labour and risk; (5) very large tracts of highly fertile soil are required, or facilities for improving the fertility by manuring at a low cost.

Notes on the Weather of September, 1911.

TRANSVAAL PROVINCE.

Observers' Weather Reports.

Summary.—The month has been exceptionally dry, there having been a deficit in the rainfall in all parts excepting the vicinity of Standerton. The season's rainfall (three months) also shows a deficit in all but the south-eastern districts, where the average was just reached, and in the Standerton District, where there was a slight excess.

Bloemhof District—

Katrina.—Very variable winds were experienced this month, but mostly from a westerly direction. Very dry; farmers anxiously looking for rain. (P. W. Lombard.)

Bethal District—

Leeuwkuilen.—From the 1st to the 15th of the month rather severe frosts for the time of the year were experienced—an average of 6 degrees for the first fourteen days. North-westerly winds have prevailed, being exceptionally strong towards the latter part of the month. Grass is quite green and fit for sheep, but rain is badly wanted for ploughing purposes. (W. J. Wayland.)

Carolina District—

Grobblersrecht.—More frost was experienced during the first seventeen days of this month than in the preceding month (August). (G. Retief.)

Waterval Boven.—A very dry and warm month, temperatures being higher than at any time during last September. The sky was generally clear. Very windy towards the end of the month. (H. C. Borcherds.)

Ermelo District—

De Hoop (Amsterdam).—A very hot and dry month. (Capt. C. W. Alston.)

Ermelo.—Hard frost was experienced early this month. The heat during the latter part of September was greater than that experienced for many years. Rain is badly needed. Vegetation is almost as backward as it was in August. (Mrs. S. M. Nicolson.)

Lichtenburg District—

Doornbult.—Very strong northerly winds were experienced from the 25th to the end of the month, which were very destructive to fruit. Rain is badly wanted. The wheat crop is suffering, as dams are dried up. (J. S. Smith.)

Lydenburg District—

Belfast.—Frosts were recorded on sixteen mornings by the grass minimum thermometer. Strong warm winds from the north were prevalent during the month. Springs and vleis are drying up. Rain badly wanted. (G. J. Imrie.)

Frankfort.—Hot, dry weather was experienced during this month. (H. H. Cawood.)

Graskop.—During the first half of the month occasional white frosts occurred, while strong hot winds were experienced during the latter half, finishing up with a very sharp thunderstorm on the night of the 30th. (G. Irvine.)

Middelburg District—

Middelburg.—Marked extremes of temperature within the space of three weeks have been recorded here during the month. During the first week 8 to 10 degrees of frost were being recorded each night, whilst but fourteen days later the hottest weather experienced at any time during the year was being recorded day after day—89 to 92 degrees maximum shade temperature. The mean maximum temperature for the month has been exceptionally high—80 degrees—whilst the mean minimum temperature has been exceptionally low—40·8 degrees. An unusual amount of high wind, filling the atmosphere with fine dust, blowing day after day from the north-west, and nearly all day long, was another trying experience of the month. But the most trying experience was undoubtedly the total

absence of any rain throughout the month, beyond a few drops on the last day. Such a month has not occurred here since 1903. Farming in this district is, in consequence, very backward. (Dr. H. A. Spencer.)

PIET RETIEF DISTRICT—

Cascades.—Hot strong winds prevailed the greater part of the month; everything is parched up. Slight snow and sleet occurred on the 7th, accompanied by thunder and lightning. (F. Bresler.)

POTCHEFSTROOM DISTRICT—

Klerksdorp.—No rain has fallen during the month, although upon two or three evenings thunder and lightning occurred, and a few drops fell, but not in sufficient quantity to register. During the last half of the month very dusty weather prevailed on most days. (H. M. Guest.)

Strathmore.—Very strong winds prevailed during the latter half of the month. (C. Scott.)

WAKKERSTROOM DISTRICT—

Wakkerstroom.—Several frosts occurred on the first half of the month. Winds have been fairly strong during the whole of the month. On the 25th a gale was experienced, which did slight damage. The latter half of the month was very warm. Local hailstorm from the east on the 30th, lasting twenty minutes; hailstones were as big as marbles, and did some slight damage. (W. Pritchard.)

ZOUTPANSBERG DISTRICT—

Krabbefontein.—The weather to about the 15th was fairly mild. From then on to the end of the month it was exceptionally hot and oppressive—dry, sultry winds from the south-east; several days showed a temperature of over 100 degrees. (G. F. Savage.)

Louis Trichardt.—A month of unbroken drought and excessive heat, with only one short interval of mist on the morning of the 12th to relieve the parching effects of northerly winds. A peculiar feature as regards the wind has been that, no matter in what direction it has been blowing at 9 a.m., it has on almost every day veered round to the north during the forenoon, and remained in that quarter until after nightfall, this no doubt accounting for the almost total absence of mist and clouds which always follow a consistent east wind. 95·2 degrees registered on the 23rd is the highest shade temperature recorded at this station in September, and has been equalled only some three or four times in the height of summer since May, 1906. (Sergt. J. C. N. Clark, T.P.)

Pietersburg.—A hot and dry month, drought being severely felt in town. (W. J. Frankleyne.)

MOCHUDI (British Bechuanaland Protectorate)—

Country and cattle in bad condition. No water except in good wells; grass burnt. Heat wave was experienced during the latter half of month; whirlwinds; winds contrary to early rains. (W. A. H. Harbor.)

NATAL PROVINCE.

As may be seen from the rainfall returns, at nearly 80 per cent. of the Natal stations the heaviest rainfall for the month occurred on the 30th. This fall was well marked throughout the Province, as at only three places, Vryheid, Utrecht, and Mpofana, in the north, no mention is made of any precipitation on that day. As it turned out, this was the beginning of one of the heaviest falls of rain on record in Natal, which lasted over the 1st, and at some places into the 2nd October, but was fortunately unaccompanied by strong winds, so that little heavy damage was done, with the exception of washaways on some of the branch lines of railway. The conditions were, therefore, very different from those observed during the storm of 31st May and 1st June, 1905, when a violent southerly gale combined with the severe rainfall to cause havoc amongst trees and vegetation generally. The storm of 18th and 19th April, 1908, was more alike in its atmospheric conditions and effect. A comparison of the records of precipitation and wind direction and force, taken at the Observatory, Durban, on the three occasions referred to, is appended.

Owing to the drought during the winter months, and to shortfall in January and February, this heavy rainfall has not brought the total for the year to date at the Observatory very much above the average for thirty-five years. At the end of September the gross total (including 3·58 in. on the 30th), was still short of the average for the nine months by over 6 in., and a fair quantity of rain will be required during the remainder of the year to maintain the average.

DATE.		WIND.		RAIN.	DATE.		WIND.		RAIN.	DATE.		WIND.		RAIN.
1905.	Time.	Direction.	Force.	In.	1908.	Time.	Direction.	Force.	In.	1911.	Time.	Direction.	Force.	In.
May 31..	3 p.m.	W.S.W.	Fresh	·02	April 17..	3 p.m.	S.W.	Light	·07	Sept. 30..	9 a.m.	—	Calm	·33
June 1..	9 a.m.	S.	Gale	9·45	,, 18..	9 a.m.	S.	Light	3·58	,, 30..	3 p.m.	S.S.E.	Strong	3·25
,, 1..	3 p.m.	S.W.	Strong	1·25	,, 18..	3 p.m.	S.S.E.	Fresh	·31	Oct. 1..	9 a.m.	S.E.	Moderate	10·10
,, 2..	9 a.m.	S.W.	Moderate	·30	,, 19..	9 a.m.	W.	Strong	9·44	,, 1..	3 p.m.	S.S.E.	Gentle	·51
					,, 19..	3 p.m.	W.S.W.	Strong	1·15	,, 2..	9 a.m.	W.	Light	1·48
					,, 20..	9 a.m.	—	Calm	·24					
			TOTAL..	11·02				TOTAL	14·79				TOTAL..	15·67

Rainfall for September, 1911.

CAPE PROVINCE.

I. Cape Peninsula:

Station	*Inches.*
Royal Observatory (*a*) 12-inch gauge	4·59
Capetown (Fire Station)	5·72
Do. (Signal Hill)	3·70
Do. (Hospital)	3·82
Sea Point (The Hall)	3·42
Table Mountain (Disa Head)	5·52
Woodstock (The Hall)	5·47
Bishopscourt	10·32
Kenilworth	6·84
Wynberg (St. Mary's)	7·48
Groot Constantia	7·86
Tokai Plantation	5·46
Muizenburg (St. Res.)	6·46
Cape Point	0·49
Blaauwberg Strand	2·02
Robben Island	2·17
Maitland Cemetery	3·94
Tamboers Kloof	5·21
Muizenberg	3·62

II. South-West:

Station	*Inches.*
Eerste River	2·68
Stellenbosch (Gaol)	4·33
Somerset West	3·80
Paarl	7·03
Wellington (Gaol)	3·93
Groot Drakenstein (Weltevreden)	7·69
Porterville Road	2·09
Tulbagh	1·70
Ceres	2·59
Rawsonville	1·81
Caledon	2·49
Hex River	0·54
Karnmelks River	2·06
Lady Grey (Division Robertson)	1·16
Robertson (Gaol)	2·39
Do. (Govt. Plantation)	2·90
De Hoop	4·00
Montagu	3·60
Danger Point	1·69
Elsenberg Agricultural College	5·44
Roskeen	2·79
Vruchtbaar	4·28
Ceres (Heatlie)	2·85
Waverley (Tulbagh)	2·45
Dwaars Riviers Hoek	9·14
De Doorns	0·34

III. West Coast:

Station	*Inches.*
Port Nolloth	0·00
Anenous	0·05
Concordia	0·00
Lilyfontein	0·17
Van Rhyn's Dorp	0·14
Dassen Island	2·24
The Towers	2·12
Malmesbury	2·00
Piquetberg	2·25
Wupperthal	0·00
Hopefield	1·80
Algeria (Clanwilliam)	1·63
Cedarberg (Clanwilliam)	2·61

IV. South Coast:

Station	*Inches.*
Cape Agulhas	1·00
Swellendam	3·30
Grootvaders Bosch	3·82
Heidelberg	1·95
Riversdale	3·00
Mossel Bay	3·37
Great Brak River	3·25
George	4·70
George (Plantation)	1·96
Sour Flats	2·78
Buffel's Nek	3·37
Plettenberg Bay	3·20
Harkerville	3·16
Lottering	4·56
Witte Els Bosch	6·11
Humansdorp	5·22
Cape St. Francis	2·88
Uitenhage (Gaol)	5·83
Do. (Park)	5·55
Do. (Inggs)	5·33
Armadale (Blue Cliff)	3·31
Dunbrody	2·04
Port Elizabeth (Harbour)	7·59
Do. (The Slip)	7·06
Do. (Walmer Heights)	8·23
Shark's River (Nursery)	7·18
Centlivres	4·34
Edinburgh	8·14
Blaauwkrantz	4·25
Kruis River	5·14
Gamtoos Station	4·6
Zoetendals Vallei	1·5

V. SOUTHERN KAROO:

Triangle	0·39
Pietermeintjes	0·41
Ladismith	2·05
Amalienstein	1·88
Calitzdorp	2·08
Oudtshoorn	1·82
Uniondale	1·75

VI. WEST CENTRAL KAROO:

Prince Albert	1·14
Beaufort West (Gaol)	1·19
Nels Poort	1·29
Camfers Kraal	0·86
Willowmore	0·87
Rietfontein	0·55
Steytlerville	1·98

VII. EAST CENTRAL KAROO:

Aberdeen (Gaol)	2·30
Aberdeen Road	2·27
Klipplaat	1·06
Winterhoek	4·09
Klipdrift	3·13
Kendrew (Holmes)	2·73
Do.	2·78
Graaff-Reinet (Gaol)	3·01
Do. (Eng. Yard)	2·92
New Bethesda	2·11
Roodebloem	1·03
Glen Harry	0·58
Wellwood	1·21
Bloemhof	1·21
Jansenville	2·13
Patrysfontein	1·71
Toegedacht	2·27
Klipfontein	2·90
Somerset East (Gaol)	4·22
Spitzkop (Graaff-Reinet)	4·56
Villeria (Aberdeen)	2·31
Grobbelaars Kraal	1·09
Gordonville (Graaff-Reinet)	2·00
Zeekoe River	4·44

VIII. NORTHERN KAROO:

	Inches.
Sutherland	0·48
Fraserburg	0·16
Carnarvon	0·00
Brakfontein	1·59
Victoria West	0·75
Britstown	1·59
Wildebeestkooij	0·60
Murraysburg	1·35
Richmond	0·31
Hanover	0·77
Theefontein	1·37
Petrusville	1·92
The Willows (Middelburg)	0·81
Colesberg	2·35
Tafelberg Hall	1·03
Varkens Kop	1·15
Culmstock	0·31
Cradock (Gaol)	0·76
Maraisburg	0·35
Steynsburg (Gaol)	0·70
Tarkastad	0·41
Drummond Park	0·00
Schuilhoek	0·13
Vosburg	0·40
Zwavelfontein	0·17
Zoetvlei	0·28
Klipkraal	0·95
Hotweg Kloof (Cradock)	1·15
Thebus Waters	0·84
Ruightersfontein	0·41

IX. NORTHERN BORDER:

Pella	0·00
Kenhardt	0·22
Van Wyks Vlei	0·03
Prieska	0·06
New Year's Kraal	0·06
Dunmurry	0·00
Karree Kloof	0·00
Douglas (Voss)	0·00
Hopetown	0·03
Newlands (Barkly West)	0·00
Barkly West	0·00
Strydenburg	0·00
Rietfontein (Gordonia)	0·00
Stoffkraal (Prieska)	0·00
Sydney-on-Vaal	0·00
Warrenton	0·18

X. SOUTH-EAST:

Melrose (Division Bedford)	1·39
Dagga Boer	1·14
Lynedoch	0·90
Alicedale	0·75
Cheviot Fells	0·61
Bedford (Gaol)	2·04
Do. (Hall)	1·92
Sydney's Hope	1·70
Adelaide	1·76
Atherstone	2·46
Alexandria	2·03
Fort Fordyce	2·10
Grahamstown (Gaol)	2·85
Sunnyside	2·88
Fort Beaufort	1·73
Katberg	1·25
Seymour	1·10
Glencairn	0·86
Lovedale	2·17
Port Alfred	1·92
Hogsback	3·40
Peddie	1·64
Exwell Park	0·95
Keiskamma Hoek	1·59

X. SOUTH-EAST (*continued*):	*Inches.*
Cathcart (Gaol)	1·23
Cathcart (Forman)	0·89
Cathcart	1·32
Thaba N'doda	2·60
Evelyn Valley	11·75
Crawley	0·85
Pirie Forest	3·91
Forestbourne	3·13
Isidenge	4·97
Kologha	3·71
Kingwilliamstown (Gaol)	2·43
Fort Cunynghame	3·73
Dohne	3·50
Kubusie	3·20
Quacu	3·72
Blaney	1·75
Bolo	2·16
Fort Jackson	1·50
Prospect Farm (Komgha)	5·18
Komgha (Gaol)	3·96
Chiselhurst	3·29
East London West	1·12
Cata	4·80
Wolf Ridge	3·93
Dontsah	3·67
Mount Coke	2·00
Albert Vale (near Bedford)	1·64
Huxley Farm (Stutt.)	2·49
Thsileni (Kingwilliamstown)	4·52
Kingwilliamstown (Pym)	4·00
Eastover	2·26
Debe Nek (Kingwilliamstown)	3·52
Middle Drift (Kingwilliamstown)	1·24

XI. NORTH-EAST:	*Inches.*
Venterstad	1·07
Mooifontein	1·29
Burghersdorp (Gaol)	0·68
Ellesmere	0·88
Broughton (Molteno)	1·10
Lyndene	0·57
Thibet Park	0·45
Sterkstroom (Station)	0·37
Rocklands	0·96
Aliwal North (Gaol)	0·75
Queenstown (Gaol)	0·07
Dordrecht	0·22
Herschel	0·81

XI. NORTH-EAST (*continued*):	*Inches.*
Lady Grey	0·80
Lady Frere	1·70
Contest (near Bolotwa)	1·66
Keilands	1·57
Barkly East	0·35
Hughenden	1·09
Indwe (Collieries)	1·44
Sunnymeade (Albert)	0·00
Clifton (Sterks.)	0·29
Edendale	2·93
Avoca (Barkly East)	0·78
Philipdale (Albert)	1·08

XII. KAFFRARIA:	*Inches.*
Ida (Xalanga)	1·65
Slaate (Xalanga)	1·51
Cofimvaba	2·26
Tsomo	1·39
N'qamakwe	1·58
Main	4·93
Engcobo	3·90
Butterworth	2·27
Kentani	7·04
Maclear	3·92
Maclear Station	4·67
Bazeya	5·10
Willowvale	5·52
Mount Fletsher	4·30
Somerville (Tsolo)	3·58
Elliotdale	5·61
Umtata	4·59
Cwebe	2·46
Tabankulu	4·78
Kokstad	2·85
Do. (The Willows)	2·91
Flagstaff	6·84
Insikeni	3·64
Port St. Johns	4·36
Umzimkulu	3·58
Do. (Strachan)	4·01
Wanstead	1·85
Lusikisiki	8·26
Elton Grange	3·37
Dihota	2·61
N'dbakazi	3·30
Clarkbury (Engcobo)	3·44
Kilrush	1·53

NATAL.

	Inches.
Durban (Point)	1·24
Do. (Observatory)	4·02
Stanger	11·11
Verulam	3·77
Mount Edgecombe	23·45
Cornubia	26·19
Saccharine	25·41
Milkwood Kraal	21·07
Blackburn	30·55
Umbogintwini	1·16
Winkel Spruit	11·15
Port Shepstone	2·20
Imbizana	3·27
Umzinto	5·32
Mid-Illovo	8·29
Bulwer	4·52
Richmond	6·26
Pietermaritzburg (N. G. Asylum)	4·32
Do. (Burger Street)	1·00
Cedara Vlei	0·81
Howick	3·36
Giant's Castle	2·72
New Hanover	4·47
Kranztkop	2·26

	Inches.		Inches.
Greytown	3·09	Ngomi Forest	3·09
Lidgetton	3·64	Ubombo	0·57
Nottingham Road	2·32	Nongoma	1·67
Estcourt	0·54	Hlabisa	0·85
Weenen	2·36	Mahlabatini	2·02
Ladysmith	1·73	Melmoth	0·97
Dundee	0·96	Empangeni	6·09
Newcastle	0·55	Mtunzini	10·27
Utrecht	Nil	Himeville	0·70
Vryheid	0·16	Mpofana	0·42
Paulpietersburg	0·22		

TRANSVAAL.

	Inches.		Inches.
Barberton	0·00	Klerksdorp	0·00
Bethal	0·18	Pretoria (Arcadia)	0·09
Bloemhof	0·00	Modderfontein	0·11
Christiana	0·04	Rustenburg	0·00
Carolina	0·07	Standerton	1·22
Ermelo	0·06	Mbabane	1·04
De Hoop	0·41	Wakkerstroom	0·00
Heidelberg	0·16	Volksrust	0·00
Vereeniging	0·03	Nylstroom	0·00
Lichtenburg	0·00	Potgietersrust	0·00
Pilgrims Rest	0·05	Joubert Park	0·15
Belfast	0·00	Observatory	0·08
Zeerust	0·00	Wolmaransstad	0·01
Middelburg	0·01	Pietersburg	0·00
Piet Retief	0·07	Louis Trichardt	0·00
Potchefstroom	0·00	Leydsdorp	0·00

ORANGE FREE STATE.

	Inches.
BETHLEHEM DISTRICT:	
Abersethin	0·79
Clifton	0·61
Kaal Laagte	0·15
Kestell	0·77
Middelpunt	0·35
Novo	0·21
Reitz	0·39
Whinburn	0·81
BETHULIE DISTRICT:	
Town	0·60
Excelsior	0·97
Niet te Weet	1·20
Normandale	0·80
Springfontein	1·40
BLOEMFONTEIN DISTRICT:	
The City—	
Government Laboratories	0·07
Grey College	0·10
St. Michael's School	0·07
Doornplaat	0·34
Dunmanway	0·10
Glen Lyon	0·25
Nieuwjaarsfontein	0·14
Pukpoort	0·30
Riversford	0·45
Roodepoort	0·05
Kromdraai	Nil
Sannah's Post	0·12
Tempe	0·07
Waaihoek	Nil
BOSHOF DISTRICT:	
Beginseldam	Nil
Knapdaar	Nil
Smithskraal	Nil
EDENBURG DISTRICT:	
Bethany Village	0·28
FAURESMITH DISTRICT:	
Bergfontein	Nil
Brakdam	0·68
Klipnek	0·20
Koffyfontein	0·68
Newlands	0·53
Tevredenheid	0·88
Middelfontein	0·71
Mimosa	0·27
FICKSBURG DISTRICT:	
Caledon Draai	0·48
Dekselfontein	0·09
Dunblane	1·12
Fouriesburg	0·65
Gunton	0·40
Hammonia	0·36
Imperani	0·35
Kalkoenkrantz	0·18
Kranskloof	0·28
Platkop	0·51
Prynnsberg	0·34
Sandford	0·31
Zuikerkop	0·48

FRANKFORT DISTRICT:	Inches.
Town	0·12
Muirton	0·10
Vryheid	0·11
Zandoog	0·05

HARRISMITH DISTRICT:	
Africk's Kop	0·55
Arbeid Adelt	0·78
Buckland Downs	1·34
Forest Station	0·74
Mill Barton	0·13
Hermitage	0·69

HEILBRON DISTRICT:	
Brereton	0·02
Honing Kloof	—
Kroonbank	0·16
Maccauvlei	0·05
Springbokvlaagte	0·05
Villiers	0·41

HOOPSTAD DISTRICT:	
Town	—
Fairfield	0·06
Rietkuil	—
Roodepoort	—

JACOBSDAL DISTRICT:	
Town	0·26
Aschboschdam	—
Aurora	—
Zoutpan	

KROONSTAD DISTRICT:	
Town	0·11
Gelukfontein	0·05
Holfontein	—
Vierfontein Mine	—
Voorspoed	0·03
Waterford	—
Hebron	

LADYBRAND DISTRICT:	
Town	0·44
Alma	0·36
Barletta	0·38
Braemar	0·30
Clocolan	0·61
Government Nursery	0·39
Modderpoort	0·31
Moria	0·81
New Vale	0·70
Westminster	0·36
Zorgvliet	0·55
Rangershoek	0·46

LINDLEY DISTRICT:	Inches.
Town	—
Kerry	0·04
Lindley Road	0·08
Waterford	0·29
Wexford	0·25

PHILIPPOLIS DISTRICT:	
Donkerpoort	2·12
Highbury	1·84
Karreefontein	3·65
Krielsfontein	1·80

ROUXVILLE DISTRICT:	
Town	0·51
Clearwater	0·20
Oudefontein	1·12
Riversdale	1·24
Sterkfontein	0·48
Wheatlands	0·53
Zastron	0·71

SMITHFIELD DISTRICT:	
Town	—
Helvetia	—

THABA 'NCHO DISTRICT:	
Burgundy	0·45
Carrigholt	0·37
Fort Bassett	0·54
Leeuw River Mills	0·38
Moroka Industrial School	0·17
Mount Stephen	0·50
The Cliff	0·34
Thorley	0·33
Wilgeboom Nek	0·16
York	0·52
Likatlong	0·19

VREDE DISTRICT:	
Woudzicht	0·63

WEPENER DISTRICT:	
Lucerne Valley	0·15
Mon Repos	0·68
Waschbank	0·58
Wonderboom	1·25
Zamenloop	0·61

WINBURG DISTRICT:	
Town	0·06
Bantry	0·18
Grootkuil	0·04
Hayfield	—
Paardekraal	0·19
Roodekop	0·19
Smaldeel	0·05
Foxhill	—

Departmental Notices.

FARM EMPLOYMENT.

Applicant, married, age 40, desires situation as farm manager. Fifteen years' experience in Natal—stock and agriculture. Proficient in dairy work and management. Good references.—"C", P.O. Box 17, Potchefstroom, Transvaal. [8]

Scotsman, married, 28 years of age, eleven years' experience of mixed farming and wattle growing in Natal, desires situation as manager on farm.—R. G. H., c/o Lake Hotel, Mooi River, Natal. [8]

Applicant, 25 years of age, desires situation as farm assistant. For past six years has been engaged on farms in Canada and England, where he has had considerable experience in all departments of agriculture; and for some time in Canada did a good deal in tobacco growing, on the American system—is thoroughly conversant with sowing, transplanting, cultivating, stripping, etc.—HERBERT WARDER, 36 Good Hope Street, Kensington, Johannesburg. [10]

Young man seeks employment on farm; Colonial born; 25 years of age. Experienced in fruit farming, and can work with cattle, horses, and mules. Speaks both English and Dutch. Strong, healthy, sober; testimonials.—G. J. ROSSOUW, jun., Rose Street, Wellington, Cape Province. [10]

Applicant, 22 years of age, desires position as manager or under manager on farm. Two years at Elsenberg Agricultural College; testimonials.—D. WOODHEAD, "Cottesbrook", Kroomie, Cape Province. [10]

Applicant seeks managership of farm. Life experience in lucerne cultivation, ostrich, sheep, and cattle farming, and agriculture. Has managed farms in Cape Province, Orange Free State, and Transvaal. Married. Testimonials.—GEO. J. HITGE, Greystones Farm, P.O. Val Station, District Standerton, Transvaal. [11]

ASSISTANCE BURSARIES AT AGRICULTURAL SCHOOLS. UNION OF SOUTH AFRICA.

It is hereby notified, for general information, that the Government has decided to grant sixteen Assistance Bursaries, to be divided between the Agricultural Schools at Elsenburg (Cape Province), Grootfontein (Cape Province), Cedara (Natal), and Potchefstroom (Transvaal), tenable for a period of two years, for deserving and needy students, on the following conditions:—

(1) Applicants must not be less than sixteen years of age and not more than twenty-one years. They must produce evidence of having passed the seventh standard of the Elementary School Course, the School Higher, or their equivalent, and also furnish certificates of age, good conduct, and health.

A certificate will also be required from a magistrate to the effect that the applicant is a deserving and needy person.

(2) Applications for these bursaries, supported by the above documents, must reach this Department, addressed to the Acting Secretary for Agriculture, not later than the 12th December next, as the successful candidates will be required to take up their studies early next year.

Applicants should also state which of the schools they would prefer to enter, and, if possible their wishes will be met in this direction.

(3) Should there be any bursary unallotted, and for any reason a particularly deserving student already at one of the Agricultural Schools become in need of financial assistance, such may be allotted to him by the Minister.

(4) The Minister may cancel without notice the award of any bursary on the ground that he is not satisfied with the conduct or progress of the student or cancel or modify it on the ground that the need for financial assistance has ceased to exist.

(5) As far as possible, the bursaries will be divided equally between the Agricultural Schools in question, but the Minister may alter the disposition of them should he deem it advisable to do so.

SEEDS FOR DISPOSAL.

The Tobacco and Cotton Division have small quantities of velvet bean seed, at 20s. to 25s. per 200 lb., free on rail Barberton or Munnik. Also peanuts (Virginian Bunch variety), at 20s. per 100 lb. (unshelled), free on rail Oriston.

All applications for seed should be made to the Chief of Tobacco and Cotton Division, Department of Agriculture, Pretoria.

BOER MANNA SEED.

The Government Dry-land Station at Lichtenburg, Transvaal, has a surplus stock of good Boer Manna seed, grown on the station, for sale. Price £1. 17s. 6d. per 100 lb. Apply to Superintendent.

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Wool Sales at Antwerp, 1912.

The Consul-General for Belgium at Johannesburg notifies that the following public sales of imported wool will be held at Antwerp in 1912:—First sale, between the 8th and the 13th January; second sale, between the 26th February and the 2nd March; third sale, between the 22nd and the 27th April; fourth sale, between the 1st and the 6th July; fifth sale, between the 16th and the 21st September; sixth sale, between the 18th and 23rd November.

Agricultural Show Dates, 1912.

At the end of the present issue will be found a list of the dates upon which it has been decided to hold the various agricultural shows in the Cape Province and the leading ones in the Orange Free State and the Transvaal. A list of o hers which are to be held in the latter two Provinces, and also of those decided upon for Natal, would be welcome, and secretaries of societies are invited to communicate the dates of their respective shows for publication.

South African Hay and Straw.

Consequent upon representations made by the South African Trades Commissioner in London, and assurances furnished by the South African Government to the effect that the whole of the Union of South Africa is free from foot-and-mouth disease and rinderpest, the Board of Agriculture and Fisheries of the United Kingdom has decided to sanction the landing in Great Britain of South African hay and straw. This decision took effect from the 16th November, and should open a market for possible surplus fodder which can be produced very cheaply in some of the coastal sections of the Union, particularly the western parts of the Cape Province.

Peat for Export Seed Potatoes.

With reference to an article on the above in the October issue, mention is made of "peat dust" as being the one article indispensable for packing potatoes for export. South Africa covers a pretty large

area, and it is strange if peat dust or peat moss is not to be found somewhere within its borders. Mr. Downing, in his letter, states "it costs landed about £5 per ton". Any samples sent to the Government Horticulturist, Department of Agriculture, Pretoria, will be duly acknowledged and their suitability or otherwise reported on.

A Commercial Information Bureau.

Many readers will probably be interested to learn that a commercial information bureau is now attached to the Office of His Majesty's Trade Commissioner at Capetown for the purpose of supplying information, free of charge, to those interested in British trade. The object of the bureau is to assemble under one roof as much commercial information as possible dealing with the trade of the United Kingdom and South Africa. In respect of up-country inquiries the bureau readily undertakes to furnish information by post. A list generally descriptive of the class of information available may be obtained upon application to the Trades Commissioner.

Destructive Veld Fires in the Transvaal.

A communication was received recently by the Acting Secretary for Agriculture from the Transvaal Landowners' Association drawing attention to the increasing prevalence of grass fires, which are causing an enormous amount of damage to both stock and property in the Transvaal, and suggesting official investigation by resident magistrates into the origin of all large destructive fires, in order to put a stop to this growing evil. The matter was referred to the Secretary for Justice, who has now instructed resident magistrates throughout the Transvaal to investigate the origin of, and report upon, any big veld fires which may have originated in their respective districts or which may still originate during the present season.

The Meaning of "Lamziekte".

A correspondent asks whether the English equivalent of "lamziekte" could not be used, in preference to the Dutch word, in referring to this disease. The term is used because it is best understood by every one concerned, and the difficulty is that its English equivalent would convey very little. "Lame-sickness" is the English translation, "osteo-malacia" the technical name of the disease, and these are the only terms which apply. The former, of course, conveys next to nothing, while the latter is too technical for general use. The term "lamziekte" covers the whole ground, as it has come to be specifically applied to the form of partial paralysis in cattle which arises from the disease.

Veterinary Query: Insufficient Data.

A Mr. John Hessel, upon whose letter no address appears, writes for advice in regard to a certain horse foal of his. The letter was referred to the Principal Veterinary Surgeon, who states that the data given by Mr. Hessel are insufficient to enable a diagnosis of the disease to be made. If Mr. Hessel will write again, going more fully into the symptoms of the trouble, the Veterinary Division may then be in a position to advise.

Cow with Morbid Tastes.

Mr. W. E. Foster, dipping inspector at Mtunzini, Zululand, sends a remarkable list of foreign matter which was found in the second stomach of a cow belonging to Mr. M. Clark, of Empangeni, Zululand, which died on the 16th ult. The list comprises eight pieces of wire, the longest of which measured 3½ inches, a half-penny, a piece of lead, and two wire nails. Either the cow must have developed a morbid appetite or she was fed and tended with very little care. People do not seem to realize the fact that animals will swallow these injurious substances when they are mixed with fodder—especially fodder that may be cut or chaffed. The use of wire on fodder bales is largely responsible for this kind of thing, but how to account for the rest of the collection is difficult. The obvious remedy is to exercise more care and keep cows from such a mixed diet.

Carnation Nematode.

Gardeners in all four Provinces are often puzzled to account for the unthriftiness and dying out of carnation plants when the soil and other conditions seem all that is required for healthy development. Quite commonly one plant dies when others about it remain healthy. Recent examinations suggest that trouble of this sort is chiefly due to one of the stem eelworms. The tissues of sickly plants swarm with these microscopic enemies. It is probable that the trouble has long been present in the country, and it is still being introduced from oversea. A lot of young plants recently imported from a prominent British florist were found to be suffering from it. Care should be taken to avoid propagating from affected plants, and unless the trouble is very prevalent on his place the careful gardener will uproot and burn the plants that show signs of being attacked. It is probable that some of the worms are able to retain their vitality indefinitely in plants that die and dry up.

Lucerne Tylenchus.

Lucerne Tylenchus, the stem eelworm which in Europe infests many kinds of plants but which in South Africa is still known in lucerne only, continues to be reported in parts of the Union not hitherto recorded to be infested. During the past month one case was reported in the Bloemfontein District of the Orange Free State and another in the Weenen District of Natal. The pest is generally introduced into lands with seed. No evidence of it within seed has been found, but lots of seed from infested fields are likely to contain minute bits of stem that contain infection. Although dried up many of the worms retain their vitality and long remain capable of becoming active when placed in moist and otherwise favourable conditions. This fact has been demonstrated by the infection of small experiment plots of lucerne with pieces of stem that had been kept dry for a year or more, and by the recovery of active worms from fragments of stem picked from amongst seeds nearly two years old. The moral is obvious. Only very thoroughly cleaned seed should be sown, and every precaution practicable be taken to ensure that that seed came from uninfested fields. The pest is very common in the older lucerne growing sections of the Cape.

South African Remounts for India.

The question of the systematic breeding in South Africa of horses of a type suitable for remounts for service in India has been raised in a very high and well-informed quarter. It appears that there is good reason for believing that the country breeding establishments in India, which are not yet completed, are not likely to satisfy India's demand in case of war, and in any case are never likely to breed horses fit for the artillery. Further, the large horse farms in Australia are gradually being broken up, and it is becoming more and more difficult every year in India to obtain the proper stamp of horse. South Africa is not included in the Indian sphere for the purchase of horses, but it would be a good thing for this country if South Africa could get back to the old days, when, in 1857, there were 5482 horses sent to India during the mutiny. At that time there was a great prejudice against the horse on account of its appearance and small size, but this feeling rapidly gave way when its staying power and general good working capacity in all the trying circumstances of a very trying campaign were recognized. Then it was agreed that the South African remount was unsurpassed. Years ago, an officer, writing, said: "There is no doubt the Cape horse stands the Indian climate much better than the Australian horse, being a hardier animal, and continuing fit for work to a much more advanced age. The Cape horses imported during the Indian mutiny are still spoken of by cavalry and artillery officers as the finest lot of horses ever imported for army purposes into India."

There thus seems to be a very good opening for horse-breeders in South Africa in the near future, and the question of improving the local breed along lines suited to army requirements is well worth taking up. Of course, the first thing to be done is to provide good stallions throughout South Africa, and be rid of the wretched nondescript undersized stallions that are roaming about the veld and preventing South Africa from producing the type of horse which would be so profitable to the country. Better attention, too, is required in the direction of providing the mare with proper nourishment whilst she is in foal, as upon this a great deal depends. The matter is one which should be earnestly considered by farmers' associations and by horse-breeders generally.

Remount Requirements of German South-West Africa.

In the above connection it is of interest to note the remount requirements of the local Government of German South-West Africa during the current year, particulars of which have been received from the British Consul at Luderitzbucht. They are estimated to be as follows:—Civil Administration, 19 horses; mounted police, 148; mounted troops, 431. The average price per horse provided in the estimates is about £35. The total number of horses provided for is 589 at a total cost of approximately £20,900. It is probable that the greater number of these horses will be purchased in the Union of South Africa. The local Government is importing high-class breeding stock and encourages horse-breeding in other ways, it being the desire of the civil authorities to establish the industry and of the military to make themselves independent of outside supplies.

Wanganellas and Rambouillets.

Arising out of a reply by Mr. Mallinson, the Flockmaster and Wool Expert for the Transvaal, to "South Australian" in the October issue, a Colesberg (Cape Province) correspondent raises a question that has probably exercised the minds of many sheep-breeders. It may be recollected that Mr. Mallinson advised "South Australian" to put a Wanganella ram to a Rambouillet ewe in order to increase the weight of the fleece, and that, at the same time, Mr. Mallinson remarked that he did not believe in mixing breeds. The question then arises, whether the Wanganella and the Rambouillet are considered by Mr. Mallinson to be the same breed. The matter was submitted to Mr. Mallinson, who remarks that the characteristics of the Wanganella sheep are essentially those of the Rambouillet improved. The foundation of the Wanganella flock in the year 1861 consisted of 200 of the best ewes in the breeding flock and 100 ewes purchased from Mr. Nicholas Chadwick, of Canally, New South Wales. The latter 100 ewes were by an imported Rambouillet ram. A French Rambouillet ram called the "Emperor" was used in the Wanganella stud flock for a number of years, and he yielded a fleece weighing 25 lb. of greasy wool. Coming to a later period, Mr. Mallinson himself went to Wanganella in the year 1900 and saw and handled a Rambouillet ram that had been recently imported. But since that time no new blood has been introduced. The conclusion can therefore safely be come to that the Wanganella is closely related to the Rambouillet. Speaking generally, the difference between the Wanganella and Rambouillet to-day is that the Wanganella is a heavier cutter and grows a longer wool. Mr. Mallinson's experience is that a Wanganella ram on Rambouillet ewes improves the progeny wonderfully.

Permanent Pastures for Natal.

An interesting indication of the increasing inclination among farmers to adopt more intensive methods is afforded by the number of inquiries which are received by the Department from various parts of the country for advice in connection with the laying down of pastures, more especially for winter use, and the growing of special crops for soiling, etc., during the same season of bare veld. Recently an inquiry was received from a farmer in the Polela district of Natal who asked for advice as to the most suitable grass to put down for winter feed as a permanent pasture. The altitude of his farm is 5700 feet, and of course the frosts are very severe. The land he proposes to plant is poor, requiring quite 250 lb. of bone-dust to the acre to grow a fair crop of mealies. The conditions obtaining on this particular farm are similar to those to be found on many a farm in the higher districts of Natal, and the reply furnished by the Director of the Division of Agriculture in Natal is therefore of more than local interest.

After exhaustive experiments with practically all approved artificial pasture grasses, extending over a period of some eight years, the Department in Natal has been compelled to the opinion that *Paspalum dilatatum* and *Phalaris commutata* are the only types which

promise to hold their own for more than two years, in the veld conditions obtaining in the midlands of Natal, against the competition of native grasses and the weeds of cultivated ground. Of the two types, at Cedara, paspalum is being planted exclusively on the light, dry hillside soils of low natural fertility, and the phalaris in vlei soils with greater content of moisture and higher relative productiveness. The former grass flourishes on the poorest of the Cedara soils and has remarkable drought-resisting capacity. It is subject to temporary frost damage but early recovers, and makes rapid growth at the first rise in temperature, even before the advent of the spring rains. It also remains green in the autumn until actually frosted down. In carrying capacity it has not been excelled by any other type tried at Cedara. As an experiment, thirty sheep were grazed for two consecutive winters on a six-acre unirrigated paddock of this grass, and came through in excellent condition. If closely grazed it is reasonably palatable to stock, and forms under such treatment a very close turf. In feeding value it is very superior to even the best veld grasses, showing a nutritive ratio of 1 to 6.54, as compared with a ratio of 1 to 13.6 for mixed grasses taken from a sample of good veld hay, and a ratio of 1 to 10.2 for blue-grass hay.

Phalaris, Mr. Sawer has found, shows greater relative frost resistance than paspalum, but it is less tolerant of drought and soil poverty. In good vlei soils, served with subsoil drainage, it has maintained vigorous growth throughout the winter at Cedara, despite the repeated occurrence of frosts ranging from 10° to 16° F. It is a softer and more palatable grass and is preferred by stock to paspalum. It contains a smaller proportion of indigestible fibre, a larger total content of protein matter and of fat, and a narrower nutritive ratio, viz., 1 to 5.71. In most situations, however, it has furnished lighter crops than the paspalum, calling as it does for more fertile soil and a larger content of moisture than are generally available. On soils containing a fair proportion of lime, a mixture of paspalum and Dutch clover has given eminently satisfactory results in some of the colder districts of Natal. Such is the only association which has to date been approved in the case of paspalum, while phalaris is uniformly planted at Cedara without admixture of other types. It has been found possible to plant paspalum at almost any season of the year and secure satisfactory results. December and January are, however, indicated by the Cedara experiments as the most suitable months, which finding renders it feasible to take a crop of mealies from the same ground by seeding the paspalum between the rows of the cereal with the last cultivation. This practice is being generally followed to cover cost of breaking the soil for the grass.

The Rain Tree of Peru Once More.

Popular notions die hard, and the "rain tree" fallacy is still well to the fore in this respect. Correspondents are still forwarding us cuttings from various papers lauding the supposed wonderful properties of this tree. Says one of these cuttings:—"It is estimated that one of the Peruvian rain trees will, on the average, yield nine gallons of water per diem. In a field of an area of one kilometre

square—that is, 3250 feet each way—10,000 trees can be grown, separated from each other by 25 metres. This plantation would produce daily 385,000 litres of water. If we allow for evaporation and infiltration we have 135,000 litres, or 29,531 gallons of rain for distribution daily." Very good arithmetic, perhaps, but this is about as far as the excellence of the statement goes. The correspondent who forwarded the cutting from which the above is quoted remarked in his covering letter that when in Durban recently he noticed a tree in Bulwer Park which was continually dripping water, and he wondered whether this could be a specimen of the famous "rain tree". We accordingly wrote to Mr. J. Medley Wood, the Director of the Botanic Gardens in Durban, and he has kindly supplied some interesting particulars in regard to the "rain tree" generally.

The tree popularly known as the "rain tree" of South America is *Pithecolobium saman*, and the reason why it bears this name, Mr. Medley Wood says, is that a suctorial insect of some kind infests the branches of the tree, producing a liquid which falls to the ground, often very copiously. Many years ago a writer in a Durban paper referred to this tree, saying that a few trees planted in the driest soil would soon turn it into a veritable swamp, and suggesting that the tree be imported by the Curator of the Botanic Gardens. Mr. Wood replied that the tree, *Pithecolobium saman*, had been growing in the Gardens for many years, but that the "veritable swamp" had not put in an appearance. Some years later the then Mayor of Durban asked Mr. Wood to inspect some trees that were growing in Berea Road, and which had been attacked by a pest of some kind. The trees were *Albizzia fastigiata*, the well-known "Flatcrown", and that the whole, or almost the whole, of the branches were—on the lower side—attacked by some suctorial insect, and the liquid was falling in large and fairly constant drops. The trees were, Mr. Wood believes, cut down to prevent the pest spreading to other trees. This insect also appears occasionally on *Celtis kraussiana*, also an indigenous tree, and on *Grevillea robusta*, an imported one. Both the *Albizzia* and the *Celtis* are to be found in Bulwer Park, but are not now attacked by this insect.

As Mr. Wood wished to learn the scientific name of this pest, he called on Mr. Chubb, the Curator of the Durban Museum. Mr. Chubb states that the dripping of water from certain trees is due to insects known as "spittle bugs" or "froth flies", belonging to the family *Cercopidae*. Several species of the genus *Ptyelus* occur in Durban, and are all concerned in the phenomenon, but Mr. Chubb thinks the commonest is *Ptyelus flavescens*. The immature, wingless insects of these species congregate in batches of as many as thirty individuals, and by inserting their rostrums into the twigs absorb the sab. At the same time a mass of froth is produced which drips more or less continually on to the ground. Sometimes the amount of liquid produced in this way is very considerable. The "Silky Oak" is mentioned as being particularly favoured by these insects. The natives have a superstitious regard for them, maintaining that if the secretion falls into the eye the sight is irretrievably lost. Mr. Chubb finds that the

adult insect is preyed upon by a solitary wasp, *Gorytes natalensis*, and on several occasions he has seen the bugs being carried by the wasps into holes in the ground, evidently as a provision of food for the young wasps when they hatch out from the egg. It is thus apparent that the "rain tree" "rains" at the expense of the vitality of the tree itself!

Trees for Stock Shelter.

In this country of hot summers and in many cases warm dry winters, the planting of trees for the sheltering of stock is almost a necessity if the animals are to be kept in anything like good condition. At the same time, on the high veld, such sweeping winds are experienced at certain seasons of the year that care has to be exercised in selecting trees that are sufficiently root-firm to withstand these strong blasts. At the instance of a correspondent at Kestell Road, in the Harrismith District, Orange Free State, some interesting and useful particulars have been secured from the Forest Department in this regard. Our correspondent referred especially to gums. and the Forest Department state that the following are the hardiest gums suitable for growing as shelter for stock in the ordinary run of veld where the soil is of fair depth in the Harrismith District:—(*a*) High shelter. about 60 to 100 feet: *Eucalyptus viminalis* and *E. gunnii*; (*b*) medium shelter, about 30 to 60 feet: *E. stuartiana* and *E. coriacea* (known as *E. pauciflora*); (*c*) low shelter up to about 30 feet: *E. coriacea var. alpina* and *E. melliodora*. (The heights given are estimated and approximate only.)

So far as the experience of the Forest Department goes these are all quite root-firm. The only situations in which they might be liable to blow over are in shallow soil: (*a*) Overlying flat rock where roots cannot penetrate into cracks; or (*b*) overlying an impermeable clay or pan formation. In both these cases roots can only develop close to the surface, and after heavy rain the soil may be too soft to withstand the high pressure caused by a strong wind. Such situations should, however, if possible, be avoided, because in them trees are also far more liable to suffer from drought than in any other. If they cannot be avoided then small bushy varieties only should be selected. if otherwise suitable to the situation.

Carrying Water Across a River.

The inquiry which appeared in the September number. regarding the best means of carrying water over a river about 80 feet wide. has attracted some little attention, and several suggestions have been put forward. Mr. Geo. A. Scott, managing director of W. & G. Scott, Ltd., of Salt River and Capetown, points out that means for carrying water over a river can be easily and inexpensively provided by straining two cable wires across the river or chasm about 4 feet apart. Wooden cross-pieces are then laid over the cables transversely on which the piping will rest. As Mr. Scott remarks, this scheme is only suitable for a pipe, as it is doubtful whether the cables could be strained sufficiently for an open channel, unless the fall were very considerable. As regards the diameter of piping necessary to carry

the water, this depends upon the fall that can be given, but probably two pipes of 18-inch diameter would be found of ample capacity to carry the water that would run in a furrow 4 feet by 1 feet 6 inches. "We notice", Mr. Scott proceeds, "your correspondent inquires about stave piping, to which you replied that it is highly spoken of by those using it, and of this fact we can produce ample testimony. It is being used for syphons through the Gamtoos River, and the farmers who put them down have recently reported they are standing exceedingly well, and although the rivers have come down several times they have not suffered the slightest injury."

Automatic Water Finder.

A correspondent living at Graaff-Reinet asks whether any readers have had experience with Messrs. W. Mansfield & Co.'s Patent Automatic Water Finder. The instrument is claimed to indicate the presence of subterranean flowing springs at depths up to 1000 feet. According to the prospectus the principle on which the instrument works is the measuring of the strength of the electric currents "which are constantly flowing between earth and atmosphere, and which are always strongest in the vicinity of subterranean water-courses, the flowing waters of which are charged with electricity to a certain degree". If this instrument does what is claimed for it, then its use will often mean a great saving in expense of unsuccessful boring, etc. Correspondence is invited from readers who may have had experience with it.

Report on Paspalum Grass in the Transvaal.

"Paspalum," a Pretoria correspondent, reports as follows on a trial made by him of paspalum grass, the seed of which was furnished by the Government Botanist (Transvaal):—"I obtained from the Division of Botany a small sample of paspalum seed in 1909. In January, 1910, I planted it in a garden bed. Every seed evidently grew, and I transplanted 30,000 plants in October, 1910, on to a piece of very poor land in the Eastern Zoutpansberg, near New Agatha, where velvet beans and soy beans practically failed. Every plant grew and spread out into nice bunches 2 feet apart. This was allowed to run to seed, and from it 25 lb. of seed was reaped. The grass has kept green all winter, as we have had no severe frosts. It may seem rather remarkable, but we have had five mares grazing on this patch (about 1½ acre) for six weeks, and they have kept in good condition. At first they had to be herded on the grass as they did not seem to like it, but after about a week they required no encouragement to go on this patch, and now they are generally to be found there and are very fond of it. At the present time the young plants are springing up in between the tufts from shaken seed, and this season it will be, from all appearances, a solid mass of grass.

"From time to time our ewes and lambs have had access to this grass during the winter, and they also have done exceedingly well. We have not lost a lamb this season, when prior to this we have failed to rear one. The natural veld is poor and utterly lacking in feeding

value, but I can see that a great future lies before us if we will only keep on putting in paspalum on to our poor lands in the Transvaal, the one patchy acre of paspalum in midwinter being worth more than any ten acres of natural veld. In fact it is going to be the salvation of the farmers in the poorer parts of our district who have to depend on stock alone, and I believe that it will turn what at present is one of the poorest districts in the country into an excellent stock-farming district. I cannot speak too highly of this grass, and would strongly advise every farmer who cannot keep his stock fat in winter to crowd in this grass everywhere. Only by practical experience can one realize the immense benefit that this grass is to one. Some of the grass measured 5 feet 4 inches in height in one year's growth, and this on land too poor to raise a crop of mealies, but land which had been ploughed for two years. I am trying other and quicker methods of establishing the grass over the farm, the result of which I will communicate to you afterwards, as the experiments are not completed."

The Making of Toilet Soap.

A correspondent asks for particulars as to the making of toilet soap. "Spon's Encyclopædia of Manufactures and Raw Materials" says:—Three distinct processes are in vogue for the fabrication of fine toilet soaps, according to the quality of the product desired. For the commoner kinds, the basis is a good grade of fitted yellow soap, taken direct from the copper, or remelted in a small steam-jacketted pan, or in a Whitaker remelter, provided with continuous coils of steam-pipe. To this are added (1) suitable colouring matter, in a soluble form if possible, such as some aniline dye; (2) some mineral salts, as carbonate of soda or potash, salts of tartar, etc., to stiffen or "close" the soap, usually about 5 per cent. in strong solution; (3) at as low a temperature as possible, the perfume. When cold, the soap is cut up into slabs, bars, and cakes, and stamped. A few formulae for perfumes are here given, calculated in each case for 100 lb. of soap:—*Brown Windsor.*—4 oz. oil of cinnamon, 1 oz. oil of cloves, 1 oz. oil of caraway, 2 oz. oil of sassafras, 2 oz. oil of bergamot; or, 4 oz. oil of bergamot, 2 oz. oil of caraway, 2 oz. oil of cassia, 8 oz. oil of lavender, 1 oz. oil of cloves, 1 oz. oil of petit-grain. *Almond Soap.*—12 oz. oil of bitter almonds, 4 oz. oil of lemon. *Honey Soap.*—8 oz. oil of citronella, 2 oz. oil of lemon-grass. *Glycerine Soap.*—2 oz. oil of cassia, 1 oz. oil of caraway, 4 oz. oil of lavender, 1 oz. oil of mirbane.

London Exhibition of South African Fruit, etc.

In connection with the reference to the above in the September issue, some further particulars have been received from the Trades Commissioner in London. It has now been definitely arranged for the show to be held on the 14th, 15th, and 16th March next. The Secretary of the Royal Horticultural Society has given an assurance that numerous silver and a few gold medals will be awarded to exhibitors. It has been thought better to await the arrival of the exhibits in London before deciding to classify them into groups for the purpose of awarding the medals. Non-perishable exhibits may be

shipped in an intermediate steamer sailing not later than the 13th February. The fruit (and other perishable exhibits) may be shipped in the mail boat sailing on the 21st February, but not later. The following is a list of articles suitable for exhibition, for the guidance of intending exhibitors:—Fresh fruit of all varieties; dried fruits, preserves, jams, fruit pulps, canned fruits, etc. (it is not considered desirable to exhibit jams or canned fruits in tins; manufacturers and others are invited only to send those contained in glass); tobacco of different classes in the leaf; cut cigarettes; calabash bowls; cereals, such as cleaned oats, barley, wheat, maize, beans, peas, lentils, etc., also a good selection (for the purpose of decoration and to add interest to the cereal stalls) of different cereals in the straw, or maize on the cob; drugs, such as aloes, buchu, euphorbia, berry wax, and argol, and particularly wattle bark—also Cape bush-tea; nuts of all sorts, such as almonds, walnuts, ground nuts, etc.; sugar, Natal tea, coffee, etc.; fibres, timber—samples of different South African timber of all varieties; rubber; floral exhibits, such as everlasting flowers, silver leaves, pressed heaths, and pictures of South African flowers if possible; pictures or photographs, suitable for lantern slides, illustrating fruit packing or the transport of fruit to the London market.

Notes on the Occurrence of Bacillary Necrosis in South Africa.

By Dr. A. Theiler, C.M.G., Acting Director of Veterinary Research

In a disease of calves called calf diphtheria which was described about twenty years ago in Europe a bacillus was found which subsequently was identified with the *Bacillus necroseos* of Bang. This identification meant that the calf diphtheria was not an independent specific disease. The same causal organism was found to be present in a number of other lesions which were detected in various affected organs, and seemed to have nothing in common with the diphtheria in calves. Thus it was found that the bacillus played a very important rôle as a cause of necrosis, appearing either by itself or as a complication with other diseases. The bacillus was noticed in necrotic lesions of the mucous membrane of the pharynx and of the intestines. It was also discovered to be responsible for a necrosis of the skin and of the lips and nose in sheep, in gangrene of the feet and teats in cows. Lesions in the liver, lungs, kidneys, etc., were also noted as a result of this infection.

Recently, in a publication of Dr. Meissner, of Germany, it was demonstrated that the bacillus was responsible for a real enzootic amongst cattle, it having caused an escharotic necrosis of the rumen, the reticulum, and the omasum (first, second, and third stomachs) in a number of oxen; and amongst a number of dairy cows it produced an inflammation of the lungs, the liver, the udder, the intestines, and of the interdigital space, the disease being accompanied by abortion and ending in the death of a number of animals.

As far as the writer is aware no publication recording the existence of the said bacillus in South Africa has yet appeared, although a good many veterinary surgeons have met with the organism in different lesions. In this short paper I propose to deal with the cases either met with by myself or submitted to me by veterinary surgeons or farmers, having as my main object the desire to draw the attention of people interested to its existence in South Africa, thereby throwing light on some hitherto obscure disease amongst cattle and sheep.

Diphtheria of Calves.—The first case brought to my notice was among the calves of a herd in the bushveld belonging to a Mr. B. One calf died, and the upper jaw was sent to me for examination. The lesions recorded were as follows:—

On the gum of the upper jaw a granulating ulcer was seen raised above the surrounding surface and covered by necrotic deposit. Some of the granulations were standing out prominently like small mushrooms. The whole gum was involved in this destructive process. On microscopical examination the presence of the necrosis bacillus could be proved.

Recently Mr. Chase, Government Veterinary Surgeon of Bechuanaland, reported a serious outbreak in Bechuanaland, occurring on the Lobatsi block of farms, affecting only calves up to twelve months of age. In one case he also noticed the lesions of the udder, but in this instance the animal recovered. The disease was noticed amongst the calves of three adjoining farmers. On one farm where there were 100 calves under twelve months old, 65 died. On another, of 17 animals affected, 5 recovered. Mr. Chase states that this percentage of recoveries is about the average. He describes the symptoms noticed as follows:—"The calf starts passing a frothy yellowish purge, refuses to suck, and the coat stares. Bloodstained saliva dribbles sometimes; also the nasal discharge is often bloodstained. Respiration is accompanied by grunting, and sometimes by a cough. This is the general run of the cases. There are a few recoveries, but not many."

There exists sometimes a difficulty in diagnosing the disease, as there are no visible signs, the calves not showing any tongue or throat lesions at all.

Mr. Chase forwarded various specimens, viz., a tongue showing two necrotic patches on the surface, portions of lung showing necrotic areas, two kidneys showing necrotic infarcts, and a portion of spleen with necrotic foci. Microscopical examination showed the presence of *Bacillus necroseos* (Bang).

Disease of the Lungs in Calves.—In March, 1910, a Mr. S., of Matjes Spruit, sent in the lung of a calf which had died of a disease unknown to him. He gave me the following notes:—

"In the first place, with one exception, every calf I have had bad has been strong and robust for at least six weeks after birth. After about six weeks or two months, and even three months, they have shown the first sign. The head droops at first; they continue to drink for two or three days, or even a week. A slime is emitted from the nose. They gradually lose their condition. Putting your ear to the shoulder the breathing sounds raspy. There is practically no diarrhœa. Towards the last two days the patient appears unsteady in his limbs, develops rapid respiration and tumultuous action of the heart. A harsh, husky cough is to be heard."

The lungs of this calf were sent for our examination, when multiple necrotic pneumonia was diagnosed, due to the presence of *Bacillus necroseos*, which was present in a pure state.

Disease of the Liver.—In November, 1910, Mr. Dale, Government Veterinary Surgeon in Potchefstroom, sent in a portion of a liver from a cow, the property of a farmer in Welverdiend. The liver was abnormally large, and was similar in condition throughout its bulk to the pieces forwarded. The piece received represented a nodular necrosis, and the microscopic examination showed the presence of the necrosis bacillus.

Disease of the Liver, Stomach, and Peritoneum.—In April, 1910, Mr. Webb, Government Veterinary Surgeon, of Zeerust, sent a smear for microscopical examination with the following notes:—"Smears of pus taken from an abscess in the liver of a dead ox belonging to the Zeerust Municipality. There were a few abscesses in and on the liver about as big as walnuts containing thick, creamy pus. There were also four or five abscesses on the outside of the reticulum, close to the edge of the liver, which also contained thick, creamy pus. There

was a considerable amount of fluid in the abdominal cavity, and acute peritonitis, with fresh adhesions between the rumen and abdominal wall."

The microscopical examination of the smear proved the presence of the *Bacillus necroseos*.

Disease in Lambs.—In June, 1910, Mr. Johnston, then the Government Veterinary Surgeon at Volksrust, brought to the Laboratory four merino lambs, stating that they belonged to the stud of a Mr. R., of Amersfoort, in which a new peculiar disease had appeared causing great mortality, about forty lambs having already died and many more being ill. The main symptoms noted were an affection of the mouth, showing inflammation of the mucosa, and a swelling of the joints, which sometimes burst and discharged pus. One of the lambs which was brought showed a diffuse swelling and a wound on the off foreleg, and on close examination it was found that the bone was broken. The wound discharged pus mixed with blood, and required a long time to heal.

Three of the lambs died soon after arrival. The post-mortem examination was made, and was as follows:—

Lamb A.—The condition was fair. The tail was docked, and at the seat of the operation was an ulcerating wound in which numerous maggots were found. On opening of the anus there were two ulcers about the size of a sixpence.

The lymphatic glands on the aperture of the thorax were enlarged, and on opening appeared to be one large abscess. The right lung was connected to the diaphragm by the walls of an abscess which contained creamy pus. The margin showed a focus of consolidation with an abscess in the centre, and another smaller abscess reaching the size of a hazelnut was found in the middle lobe. The right lobe of the liver was attached to the ribs by means of the walls of an abscess, reaching the size of a fist and containing green purulent matter. In the centre of the liver was found a sequestered piece about the size of a hen's egg.

Lamb B.—The post-mortem examination was made shortly after death. The tail was docked, and the stump had an ulcerating surface. The mucous membrane at the base of the tongue and that of the pharynx showed hyperaemia and injection of the blood-vessels. The diaphragm showed fibrous thickenings and suppuration. The left lung showed a focus of hepatization containing on section a small abscess. The bronchial and mediastinal glands were swollen and haemorrhagic. The left lobe of the liver showed considerable distortion, caused by the presence of a number of abscesses with thick capsules. A similar abscess was found in the right lobe. The parenchyma of the liver was yellowish, soft, and friable.

Lamb C.—The pulmonary pleura was attached to the costal pleura. The lungs contained a number of consolidated foci, in which were found abscesses containing necrotic matter.

The microscopical examination of pus taken of the various abscesses of the three lambs showed the presence of the *Bacillus necroseos*.

From these notes it can be seen that also in South Africa the necrosis bacillus can be the cause of quite a number of fatal diseases which at first sight seem in no way connected with each other, and the

number of casualties due to this cause will probably be found to be larger once the presence of this bacillus has been fully realized and care is taken to diagnose it.

The necrosis bacillus is a fine, slender rod, growing on artificial media as well as in the tissue into large threads, easily stainable with the usual aniline dyes. It grows only at the t mperature of the body and in the absence of oxygen. In the tissue it is usually found at the edge of the necrotic lesions bordering the healthy tissue, thus indicating that by the production of toxins it c uses the death of the cells into which such toxins diffuse. Infection under natural conditions may take place either through the natural openings of the body or through wounds. The diphtheria of calves is undoubtedly transmitted by direct contact. It is also possible that the infection may enter the system through the navel, and the lambs referred to previously probably became infected in this way or through the wound of the docked tail. Of the different diseases in which the necrosis bacillus is found, diphtheria of calves in South Africa seems also to be the most common one, and one which can be recognized by the farmer himself.

The first symptoms which may lead to suspicion are salivation, and on examining the cheek from the outside on one or the other side, or on both, a hard painful swelling may be noted, and on the corresponding position on the mucosa in the mouth a thickening can be felt with the finger. Making a closer inspection of the inside of the mouth similar thickenings or yellow deposits can be noted on the gums and on the swollen tongue. A little later a discharge from the nose takes place, being of a yellowish colour, and the nose becomes blocked with a dirty yellow friable mass, causing the calf to have difficulty in breathing. The calves refuse to suck; they show difficulty in swallowing. When a cough appears the respiration becomes accelerated and different complications in the pharynx and lungs may be expected. From our notes it appears that an inflammation of the lungs may be present without any lesions in the mouth.

In the majority of cases calf diphtheria ends in death, either rapidly (within a few days) or slowly (within two to three weeks), the inflammation of the lungs frequently being the direct cause of death.

The treatment of calf diphtheria consists in washing out the mouth with lukewarm water and by removing the necrotic patches where such is possible, and by painting those which cannot be removed with a 5 per cent. permanganate of potash solution. At the same time the sick calves must be well nursed.

The main treatment, however, consists in arresting the spread of the disease, and for this purpose the healthy calves should be removed from the flock and placed into clean places and a thorough disinfection of everything with which sick animals have come in contact should take place, even going as far as to dig out the ground and covering it with fresh gravel and sand. People attending sick and healthy calves should also take care and particularly disinfect their hands after handling the sick animals.

In the case of lambs dying of bacillary necrosis infection, it will be advisable to attend to the wounds caused by docking and to the navel, as it is not yet clearly demonstrated by which way the bacteria enter into the system. It would be advisable to treat the wound with

some caustic; for instance, liquid carbolic acid, which, when carefully done, involves no risk. The result will be the formation of a crust under which the wound heals. When the infection has taken the character of an epidemic then it is advisable to remove the lambs to new ground and to disinfect the kraals or premises where they have been, as the necrosis bacillus is discharged with the secretion of the wound and can live outside the body for a considerable length of time.

Covent Garden Market Notes.

By R. A. Davis, Government Horticulturist (Transvaal).

During May, June, and July I found many opportunities of visiting this market and interviewed most of the principal fruit dealers at different times. The views expressed with regard to different South African fruits were, in some cases, remarkable, and, perhaps, tinged with prejudice, either for or against our citrus product. Those dealers who handled them spoke favourably, whilst others to whom none had been consigned had not a good word for them. One firm was emphatic in the statement that Transvaal seedling oranges were a second-rate fruit, corky, puffy, and full of seed, and only sold because they came at a time when the market was bare.

They claim that no South African citrus fruit is as good as that from California, nor, they say, are any grape fruit in the world able to compare for a moment with the Jamaica article. I do not agree with this, because I know very well that in South Africa citrus fruits of all kinds are to be found equal to any. I admit that the seedling oranges are difficult to classify and that many types get into one box, giving a run that is not uniform, and because the bulk of our oranges are seedlings, this cannot be avoided. It all goes to point out the necessity of using grafted trees which will produce one type of fruit throughout.

As to grape fruit, even the California growers state that they cannot produce them as well as Florida can. The Jamaica article is too large and coarse at present, and is, as a rule, not grown as carefully as those from Florida.

Messrs. Poupart state that the Transvaal and South African seedling oranges are a good article, that they have colour, quality, and flavour, but that they come a bit irregular in the box, that is, not all one type throughout. I went over their warehouse and saw some hundreds of boxes of Rustenburg fruit just arrived from the boat. There was a good deal of waste in one lot, which had been held over for a week at Capetown Docks. The other fruit was good—well packed; in fact there was a difficulty to find any fault with it. Nevertheless, prices realized for all the earlier consignments were low, due to the abnormal crops of soft fruits, berries, etc. The strawberry crop was simply enormous, and it was not until the berry crops were out of the way that prices for South African oranges began to improve.

The last time I visited the market was early in October, and I then saw navel oranges from the Cape selling for 24s. per case. These navels were equal to the best Californian. The market for naartjes is not good. Folks in England do not know much about this fruit and do not easily take to any new thing. I saw mandarins from Spain, 420 in a box, selling at 30s. per case—more freely than

Natal small boxes; possibly in time the naartje may "catch on" in England, but it will take a deal of pushing, and some time must elapse and a good deal of unprofitable business will be done before the naartje becomes a household word like the orange.

The oranges coming in from Natal were in bad condition. Navels were very inferior in size and covered with red and mussel scales. It is in just such cases as these that a Fruit Marks Act would step in. One consignment was a disgrace to South Africa. Naartjes also came to hand in boxes 12 × 12, the fruit not graded for size, and badly packed into the bargain.

Cape pears were largely in evidence. Messrs. Munro say they are the best Colonial pears which come to England; they were certainly fine fruit, well packed and turned out in every way. The Rhodes Fruit Farms were well represented. I saw also Australian pears. These arrived mostly in 20-lb. boxes, but there were a few instances where single layers came forward. The fruit was not as good as the Cape stuff; it was badly packed and the boxes were made of unsightly wood. I do not know what kind of wood it was, but it had the effect of making the box look dirty. The only complaint I heard about South African pears was with regard to the boxes in which Easter Beurres were packed; the wood is too thin, and the ordinary single layer box too slight to carry a bulky pear of this type perfectly.

Tasmanian apples came over in large quantities; these were good, clean, nice-looking fruit, consisting mainly of Ribstone pippins, Jonathans, and Cleopatras, or New York pippin, as this apple is called in England.

Australian apples were also to the fore; in no case were they packed as well as the ordinary Californian boxes.

Cape grapes were in evidence also and were doing well. All dealers want the 10-lb. box; they claim they can handle them so much more easily than larger ones, and that small packages pay better than large ones.

Australia was sending red and white Almeria grapes in 20-lb. boxes with cork-dust packing; these sold for 27s. per box, and it struck me that the Western Province would be able to do this business equally well.

Pineapples were represented by the most perfect smooth Cayennes from St. Michaels. The fruit was the finest I have ever seen and each specimen perfect. The pines were packed in boxes 40 × 20 × 9 and sold at an average of 5s. each. A box contained from six to twelve, and the fruit was packed in the dried leaves of the plant.

Messrs. Garcia, Jacobs & Co. were selling Florida pines of an inferior type at 20s. to 25s. per case. These were packed in boxes slightly larger than those we use for oranges and sold practically for 1s. each. Each pine was wrapped in paper up to the top which was left exposed. They carried well and opened up in good condition.

Avocado pears arrived from Natal in very poor condition. I went through twelve boxes at Messrs. Poupart's, and out of the lot could only find twelve sound fruits. I saw this fruit arrive on different occasions, and on none was there a sound box. Much more work must be done in the way of experiment before we can rely

on placing shipments of these in Europe in a good condition. Those that were sound fetched 15s. per dozen wholesale.

Mangoes.—Investigations into the results of the shipments of this fruit from Barberton went to show that "black spot" (which is by no means confined to South Africa) had developed en route and consequently much fruit was badly out of condition. I saw at G. Munro's store mangoes from South America which had the disease as badly as any I have seen here. The salesman who handled our mangoes expressed himself as much pleased with their colour and quality, and strongly recommended that growers should send them over in ventilated hold and not in cool chamber. I am reluctant to advise this, but the method should be tested. There were sound mangoes from Bombay which had been sent over in this way; they had not even a trace of disease about them. I was told that the cool chamber developed the disease whilst warmer conditions retarded it. This is in direct opposition to experience with all other classes of fruit.

Pawpaws from Jamiaca arrived in fair condition. I am inclined to think that for a limited quantity there is a good market, but so far have not heard of many coming from South Africa; the journey is a long one and great care would be necessary in packing.

The melon business was good, though none were arriving from South Africa; it seems that what is known as the Cape winter melon is liked fairly well, but that a better article would be much appreciated, and would easily fetch considerably enhanced prices. I have secured seeds which will be tested, and it is hoped that some of these will supply the required article.

No system of distribution of South African fruit exists in England. It is especially necessary, if the fruit export trade is to attain those proportions which it ought to do, that some system be inaugurated and that at the earliest possible date.

What distribution exists is the result of ordinary business methods on the part of the London dealers—they do what distributing is done, whereas it should be done by some one individual stationed at Southampton. This official would of necessity have to be appointed and paid by the fruit growers themselves, and it is here that some difficulty might occur. Given that a smart, reliable man with business ability had the handling of all the South African fruit on arrival at the port, we should not have one market glutted and prices going down below paying point. It would be his business to be in touch with all the large cities and to split up consignments and deflect them here and there according to the market. Such was the system of distributing fruit when I left California fourteen years ago, and it has been elaborated now to such an extent that it may be said to be perfect.

In discussing this matter with Mr. Frederic Harrison at the office of the Trades Commissioner, he objected to it on the score that the expense would be too great. A certain amount of fruit does find its way to the large cities of the north, however, and if it pays dealers to send to these places, it would pay growers also. The matter is one for consideration by fruit exporters generally.

Stock Sale at Potchefstroom.

Photo by T. Brittain.

Parade of Cattle.

Government Experimental Farm, Potchefstroom.

ANNUAL SALE OF THOROUGHBRED STOCK.

On the 1st November the annual sale of Government stock at the Experimental Farm, Potchefstroom, was held. The sale was attended by the largest number that has yet been seen there, and the prices realized showed a real demand for stock of the right and useful kind.

About six hundred persons were present at the usual luncheon. The Right Hon. General Botha, Prime Minister and Minister of Agriculture, presided, and among those present were Lord Methuen, the Hon. H. C. Hull, General and Mrs. O'Brien, the Hon. J. Rissik, Mr. M. A. Goetz (Mayor ot Potchefstroom), Colonel Tagart, Colonel Drake, Mr. F. B. Smith (Acting Secretary for Agriculture), Mr. A. G. Robertson, and Mr. Alex. Holm (the General Manager of the Experiment Farm).

In the course of his speech, responding to the toast of "Agriculture", proposed by Lord Methuen, General Botha said that when he spoke recently in Pretoria he referred more particularly to the subject of agriculture and of the system of taking more out of the ground than was put in. He would now like to say a few words with reference to cattle breeding. To-day the Government were selling pedigree stock to the public of South Africa in the best possible condition, and he wanted to ask the buyers to take care of the animals in that condition, because it would not only benefit them but benefit would accrue to their neighbours. It was true they were paying too much for the animals at present, and he could only say that he wished he could govern with the same tight reins as Lord Methuen, who laid down the rule that the prices to be realized should not be more than such an amount. The difference between the two positions was that, while Lord Methuen's treasurer was across the sea, General Botha's treasurer sat next to him. But the speaker hoped that ultimately they might be able to hit on some better method of selling their cattle, because he felt there was something wrong in the present system.

General Botha went on to express the opinion that they were not doing sufficient for their cattle in South Africa. They were wrong in that they expected the farm to go ahead by itself. They really could not expect that the ordinary rainfall would be sufficient for their farming; but he was very grateful to see that throughout the country a better system was gradually taking root. He felt convinced that if they only fed their cattle better they would get better results. The percentage of increase would be much larger than they were obtaining to-day. It was noticeable to-day that the farm could only carry a certain number of cattle, and unless they adopted other measures the number that could be carried on the farm would remain stationary. For that reason some scientific principles should be adopted. If they

Stock Sale at Potchefstroom.

Photo by T. Brittain

Parade of Horses

travelled over Europe and saw the scientific methods employed with such good results, they would recognize that in South Africa there was plenty of scope for scientific farming. The matter was being tackled, but they must keep their ears open and be capable of adapting the principles to the industry in this country. Then there would be nothing which they would not be able to put straight in the country.

Let them look at one point—that of sheep breeding. They allowed all old sheep to die off; they never sold them. Every year between two and three million sheep were allowed to die. Other countries acted differently. The sheep that would here be allowed to die were fed up and put on the market. If they would do that there was no reason why they should not export a large number of ewes. The speaker was a sheep farmer and probably suffered from the same defect; he did not exclude himself from that criticism.

A farmer should not be satisfied with his position as it stood to-day; every year he should improve his position. He was gratified to see so many sons of farmers on the Experimental Farm—of people whom he would not have expected to send their sons. If they only talked less about education and gave their children more education it would be much better for every one of them, because if there was one thing which in the past had been neglected in South Africa it was agricultural education. There did not exist a more beautiful, a better, and a more noble industry than agriculture in the world, and if they sent their sons to get a good education in agricultural subjects they were being prepared for the noblest occupation possible.

The Director of Agriculture, with all his experts, was the servant of the public, and it was to be hoped that the people would make use of the facilities afforded them. He hoped that the farmers would make use of the farm; that they would not wait for sale days, but on ordinary days would visit the place and converse with the manager, and he was certain they would obtain some instructive hints that would be useful to them on their own farms.

Concluding, General Botha thanked the company for the interest shown in the farm, for as long as the Government enjoyed that support and co-operation they would not stand still but would progress. They would do their best to place agriculture on a higher plane than it stood to-day.

LIST OF THE PURCHASERS.

The sale was well attended, and prices generally ranged high. The following is a list of the stock sold, together with the names and addresses of the purchasers and summaries of the prices realized:—

STOCK SALE AT EXPERIMENT FARM, POTCHEFSTROOM.

NAMES AND ADDRESSES OF PURCHASERS AND PRICES REALIZED.

Lot.	Purchaser.	Stock Purchased.	Price. £ s. d.	Total. £ s. d.
A	T. W. Armitage, Holmdene, Standerton	1 Thoroughbred colt	84 0 0	84 0 0
B	Mrs. L. Dixon, P.O. Box 62, Witbank	1 Thoroughbred colt	75 12 0	75 12 0
C	General Louis Botha, Standerton	1 Thoroughbred colt	70 7 0	70 7 0
1	G. Rousseau, Potchefstroom	1 Friesland bull (D0A 14 P.)	162 15 0	165 18 0
73	„ „	1 Large Black boar (D0A 234 P.)	3 3 0	
2	F. W. Olmesdahl, Piet Retief	1 Friesland bull (D0A 16 P.)	137 11 0	137 11 0
3	Mr. A. Kinkeade, Harrisburg	1 Friesland bull (D0A 18 P.)	199 10 0	199 10 0
4	H. Ellcombe, Johannesburg	1 Friesland bull (D0A 19 P.)	131 5 0	131 5 0
5	C. Bateman, Standerton	1 Ayrshire bull (D0A 32 P.)	47 5 0	70 7 0
8	„ „	1 Berkshire sow (D0A 86 P.)	9 9 0	
16	„ „	1 Berkshire boar (D0A 88 P.)	13 13 0	
6	R. B. Barron, Platrand, Standerton	1 Ayrshire bull (D0A 33 P.)	47 5 0	47 5 0
7	J. Swarbreck, Boskop	1 Ayrshire bull (D0A 34 P.)	29 8 0	29 8 0
8	P. M. Verveen, Zandriverspoort, P.O. Rita, Zoutpansberg	1 Lincoln Red Shorthorn bull (L0A 29 P.)	42 0 0	42 0 0
9	J. E. Macmillan, Wondilla, Wolmaransstad	1 Shorthorn (Coates) bull (D0A 3 S.)	68 5 0	68 5 0
10	W. G. Charter, P.O. Kriel, Bethal Station	1 Shorthorn (Coates) bull (D0A 8 S.)	73 10 0	73 10 0
11	A. P. Thorpe, Lake Chrissie	1 Shorthorn (Coates) bull (D0A 9 S.)	36 15 0	36 15 0

			£	s.	d.	£	s.	d.
12	J. Jeppe, P.O. Box 60, Johannesburg	1 Shorthorn (Coates) bull (D0A 10 S.)	42	0	0	42	0	0
13	F. G. Wiseman, Dargle Road, Natal	1 Shorthorn (Coates) bull (D0A 12 S.)	29	8	0	29	8	0
14	T. Brookes, Hattingh Spruit, Dundee, Natal	1 Shorthorn (Coates) bull (D0A 13 S.)	39	18	0	39	18	0
15	John Hamilton, P.O. Cedarmont, Standerton	1 Hereford bull (D0A 20 S.)	40	19	0	40	19	0
16	C. Spencer, Devon	1 Hereford bull (D0A 21 S.)	32	11	0			
26	,, ,,	1 Sussex bull (D0A 39 P.)	48	6	0	80	17	0
17	W. A. McLaren, Vereeniging	1 Hereford bull (D0A 30 P.)	91	7	0			
25	,, ,,	1 Sussex bull (D0A 38 P.)	53	11	0	144	18	0
18	Messrs. Hudson & Frames, Middelburg	1 Hereford bull (D0A 32 P.)	89	5	0	89	5	0
19	C. X. Smith, Val Station	1 Hereford bull (D0A 33 P.)	57	15	0	57	15	0
20	H. G. v. d. Hoven, P.O. Box 22, Johannesburg	1 Sussex bull (D0A 48 P.)	46	4	0			
4	,, ,, ,,	1 Tasmanian Merino ram (D0A 102 E.)	10	10	0			
6	,, ,, ,,	1 Tasmanian Merino ram (D0A 14 E.)	10	10	0			
7	,, ,, ,,	1 Tasmanian Merino ram (D0A 80 E.)	13	2	6			
8	,, ,, ,,	1 Tasmanian Merino ram (D0A 82 E.)	13	2	6			
3	,, ,, ,,	1 Angora ram (D0A 3 P.)	2	2	0			
5	,, ,, ,,	1 Angora ram (D0A 10 P.)	3	3	0			
30	,, ,, ,,	1 Berkshire boar (D0A 111 P.)	4	14	6			
32	,, ,, ,,	1 Berkshire sow (D0A 93 P.)	4	4	0	107	12	6
21	G. H. Spraggon, Lake Chrissie	1 Sussex bull (D0A 34 P.)	43	1	0	43	1	0
23	Messrs Fothergill & Heard, Vogelfontein No. 883, Zwartruggens Station	1 Sussex bull (D0A 36 P.)	39	18	0	39	18	0
24	M. Hillman, Longsluit, Kinross	1 Sussex bull (D0A 37 P.)	44	2	0	44	2	0
27	A. Oosthuizen, Jachtfontein, Bank Station	1 Afrikander bull (D0A 14 P.)	21	0	0	21	0	0
28	Mr. Jooste, c/o Jooste & Bryant, Johannesburg	1 Afrikander bull (D0A 15 P.)	34	13	0	34	15	0
29	Hugh Calderwood, Mooi River (Rosetta), Natal	1 Afrikander bull (D0A 16 P.)	21	0	0	21	0	0

NAMES AND ADDRESSES OF PURCHASERS AND PRICES REALIZED—(*continued*).

Lot.	Purchaser.	Stock Purchased.	Price.	Total.
			£ s. d.	£ s. d.
1	F. Visser, Naauwpoort, Cape Province	1 Tasmanian Merino ram (D0A 17 E.)	15 15 0	15 15 0
2	J. J. du Toit, Naauwpoort, Middelburg, Transvaal Province	1 Tasmanian Merino ram (D0A 54 E.)	11 11 0	11 11 0
3	J. M. Maritz, Utrecht, Transvaal Province	1 Tasmanian Merino ram (D0A 89 E.)	8 8 0	8 8 0
5	Messrs. R. & A. Kent, Geysdorp, Transvaal Province	1 Tasmanian Merino ram (D0A 137 E.)	16 5 6	16 5 6
9	A. du Preez, Blackhill, Middelburg	1 Tasmanian Merino ram (D0A 96 E.)	10 10 0	
10	” ”	1 Tasmanian Merino ram (D0A 152 E.)	10 10 0	21 0 0
11	C. A. Marais, Breyten	1 Rambouillet Merino ram (D0A 45 S.)	11 11 0	
13	” ”	1 Rambouillet Merino ram (D0A 48 S.)	9 9 0	21 0 0
12	J. C. Cronje, Vlaakplaats, Potchefstroom	1 Rambouillet Merino ram (D0A 46 S.)	9 9 0	
16	” ” ”	1 Rambouillet Merino ram (D0A 56 S.)	8 2 9	17 11 9
14	H. de Waal, Wolmaransstad	1 Rambouillet Merino ram (D0A 51 S.)	3 13 6	
15	” ”	1 Rambouillet Merino ram (D0A 55 S.)	5 15 6	9 9 0
17	Messrs. Montgomery & Phillips, Munnik (Pietersburg)	1 Suffolk Down ram (D0A 10 S.)	4 14 6	
23	” ” ”	1 Suffolk Down ram (D0A 23 S.)	3 3 0	
28	” ” ”	1 Persian ram	2 2 0	9 19 6
18	Messrs. Hardwick & Symonds	1 Suffolk Down ram (D0A 24 S.)	4 4 0	
21	” ”	1 Suffolk Down ram (D0A 34 S.)	4 14 6	8 18 6
20	W. Hosken, Ennerdale South	1 Suffolk Down ram (D0A 29 S.)	3 13 6	3 13 6
57	A. J. Barnard, Fonteintje, Bethany, Orange Free State	1 Large Black boar (D0A 225 P.)	5 5 0	
22	” ” ”	1 Suffolk Down ram (D0A 44 S.)	4 14 6	9 19 6
25	Messrs. Hagget & Ovens, Ventersdorp	1 Suffolk Down ram (D0A 38 S.)	3 13 6	3 13 6

			£	s.	d.	£	s.	d.
26	R. Smith, Mooibank, Potchefstroom	1 Suffolk Down ram (D0A 47 S.)	3	13	6	3	13	6
27	F. P. Mockford, Pietersburg	1 Persian ram (D0A)	2	2	0	2	2	0
29	G. Rocher, Potchefstroom	1 Persian ram	2	2	0			
32	” ”	1 Persian ram	1	1	0	3	3	0
30	C. H. Olivier, Haaskraal, Potchefstroom	1 Persian ram	1	11	6			
3	” ” ”	1 Persian ram	1	16	9	3	8	3
1	The Trappist Mission, Waschbank, Natal	1 Angora ram (D0A 3 P.)	4	4	0			
2	” ” ”	1 Angora ram (D0A 4 P.)	5	5	0	9	9	0
4	Hon. J. Rissik, Pretoria	1 Angora ram (D0A 5 P.)	5	5	0			
7	” ”	1 Angora ram (D0A 14 P.)	6	6	0			
9	” ”	1 Angora ram (D0A 17 P.)	5	5	0	16	16	0
6	J. M. Koster, The Lakes, Potchefstroom	1 Angora ram (D0A 12 P.)	2	2	0	2	2	0
8	M. Badenhorst, Klerksdorp	1 Angora ram (D0A 16 P.)	5	5	0	5	5	0
1	Tweespruit Co-operative Dairy, Orange Free State	1 Berkshire boar (D0A 101 P.)	19	19	0			
4	” ” ” ”	1 Berkshire boar (D0A 91 P.)	8	8	0			
7	” ” ” ”	1 Berkshire boar (D0A 94 P.)	8	8	0			
11	” ” ” ”	1 Berkshire sow (D0A 77 P.)	8	18	6			
13	” ” ” ”	1 Berkshire sow (D0A 79 P.)	8	8	0			
24	” ” ” ”	1 Berkshire boar (D0A 103 P.)	10	10	0			
27	” ” ” ”	1 Berkshire boar (D0A 107 P.)	8	8	0			
33	” ” ” ”	1 Berkshire sow (D0A 94 P.)	5	5	0			
53	” ” ” ”	1 Large Black boar (D0A 220 P.)	8	8	0			
54	” ” ” ”	1 Large Black boar (D0A 221 P.)	9	19	6			
56	” ” ” ”	1 Large Black boar (D0A 223 P.)	9	9	0			
58	” ” ” ”	1 Large Black boar (D0A 228 P.)	6	16	6			
64	” ” ” ”	1 Large Black sow (D0A 222 P.)	8	8	0			
66	” ” ” ”	1 Large Black sow (D0A 224 P.)	11	0	6			
69	” ” ” ”	1 Large Black boar (D0A 229 P.)	7	7	0			
70	” ” ” ”	1 Large Black boar (D0A 231 P.)	5	5	0			
71	” ” ” ”	1 Large Black boar (D0A 232 P.)	5	15	6			
72	” ” ” ”	1 Large Black boar (D0A 233 P.)	6	6	0			
74	” ” ” ”	1 Large Black boar (D0A 235 P.)	5	15	6	162	15	0

NAMES AND ADDRESSES OF PURCHASERS AND PRICES REALIZED—(*continued*).

Lot.	Purchaser.	Stock Purchased.	Price.	Total.
			£ s. d.	£ s. d.
2	J. L. Brugmann, Ermelo	1 Berkshire boar (D0A 89 P.)	7 7 0	
12	,, ,,	1 Berkshire sow (D0A 78 P.)	6 16 6	14 3 6
3	Land Settlement Board, Orange Free State	1 Berkshire boar (D0A 90 P.)	9 9 0	
15	,, ,, ,,	1 Berkshire sow (D0A 85 P.)	11 11 0	
20	,, ,, ,,	1 Berkshire sow (D0A 90 P.)	11 11 0	
47	,, ,, ,,	1 Large Black boar (D0A 215P.)	10 10 0	43 1 0
6	H. E. Ball, Lyttelton Junction	1 Berkshire boar (D0A 93 P.)	8 8 0	8 8 0
9	R. E. Smith, Rooikopjes, Rayton Station	1 Berkshire sow (D0A 89 P.)	8 18 6	
18	,, ,, ,,	1 Berkshire boar (D0A 98 P.)	10 10 0	
34	,, ,, ,,	1 Berkshire sow (D0A 95 P.)	3 13 6	23 2 0
10	G. Parker, Veerfontein, Orange Free State	1 Berkshire sow (D0A 76 P.)	6 6 0	
19	,, ,, ,,	1 Berkshire boar (D0A 99 P.)	11 11 0	
21	,, ,, ,,	1 Berkshire sow (D0A 91 P.)	7 7 0	25 4 0
10	The Hon. H. C. Hull, Lichtenburg	1 Berkshire sow (D0A 51 P.)	10 10 0	
22	,, ,,	1 Berkshire sow (D0A 92 P.)	4 4 0	
39	,, ,,	1 Berkshire boar (D0A 116 P.)	4 4 0	
63	,, ,,	1 Large Black sow (D0A 223 P.)	10 10 0	
68	,, ,,	1 Large Black sow (D0A 226 P.)	14 3 6	43 11 6
14	The Volksrust Creamery, Volksrust	1 Berkshire sow (D0A 80 P.)	6 6 0	
23	,, ,,	1 Berkshire boar (D0A 102 P.)	8 18 6	
35	,, ,,	1 Berkshire sow (D0A 96 P.)	3 3 0	18 7 6
17	H. Penbirthy, P.O. Box 151, Randfontein	1 Berkshire boar (D0A 97 P.)	10 15 3	10 15 3
25	Capt. Wood, Cantonments, Potchefstroom	1 Berkshire boar (D0A 104 P.)	7 17 6	7 17 6

			£	s.	d.	£	s.	d.
26	F. A. Noyce, P.O. Nigel	1 Berkshire boar (DOA 106 P.)	6	16	6			
49	„ „	1 Large Black boar (DOA 219 P.)	7	7	0	14	3	6
28	H. Lorentz, Pretoria	1 Berkshire boar (DOA 108 P.)	6	6	0	6	6	0
29	P. Bletchley, Boskop	1 Berkshire boar (LOA 110 P.)	6	16	6	6	16	6
31	—. Davidson, Esq., P.O. Pyramids	1 Berkshire boar (LOA 112 P.)	5	15	6	5	15	6
36	C. du Preez, Potchefstroom	1 Berkshire sow (DOA 92 P.)	3	13	6	3	13	6
37	J. L. Firth	1 Berkshire sow (DOA 113 P.)	7	17	6	7	17	6
46	Jas. Ross, Reitz, Orange Free State	1 Large Black boar (LOA 212 P.)	14	3	6			
59	„ „ „	1 Large Black sow (DOA 217 P.)	10	10	0			
60	„ „ „	1 Large Black sow (DOA 218 P.)	9	9	0			
61	„ „ „	1 Large Black sow (DOA 219 P.)	10	10	0			
62	„ „ „	1 Large Black sow (DOA 220 P.)	9	19	6			
63	„ „ „	1 Large Black boar (DOA 221 P.)	12	1	6	66	13	6
48	G. Stoney, Kimberley	1 Large Black boar (DOA 216 P.)	6	16	6	6	16	6
50	The Driefontein Fruit Farm, P.O. Box 348, Johannesburg	1 Large Black sow (DOA 214 P.)	13	2	6			
51	„ „ „ „	1 Large Black sow (DOA 215 P.)	11	11	0			
67	„ „ „ „	1 Large Black sow (DOA)	12	1	6	36	15	0
52	Geo. Shaw, Westminster	1 Large Black sow (DOA 216 P.)	12	12	0	12	12	0
55	H. Clayton, P.O. Box 3621, Johannesburg	1 Large Black sow (DOA 222 P.)	9	19	6	9	19	6
		Total				£2865	17	3
		Poultry Division				79	4	0
		GRAND TOTAL				£2885	1	3

AVERAGE PRICES.

CATTLE AND HORSES.

	Number Sold. Bred on Farm.	Number Sold. Imported	Highest Price.	Lowest Price.	Last Year's Average Price.	Average Price, 1911.	Total, 1911.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Thoroughbred colts	3	—	84 0 0	70 7 0	—	76 13 0	229 19 0
Friesland bulls...	4	—	199 10 0	131 6 0	72 15 0	157 15 3	631 1 0
Ayrshire bulls....	3	—	47 5 0	29 8 0	53 16 3	40 19 6	123 18 0
Lincoln Red Shorthorn bulls....	1	—	—	—	51 9 0	42 0 0	42 0
Shorthorn (Coates) bulls.........	6	—	73 10 0	36 15 0	44 12 6	48 6 0	289
Hereford bulls...	5	—	91 7 0	32 11 0	48 7 9	62 7 5	311
Sussex bulls.....	6	—	53 11 0	39 18 0	37 2 0	45 17 0	275
Afrikander bulls..	3	—	34 13 0	21 0 0	31 15 3	25 11 0	76 1
						TOTAL... £	1980 6

SHEEP, PIGS, AND GOATS.

	Number Sold. Bred on Farm.	Number Sold. Imported	Highest Price.	Lowest Price.	Last Year's Average Price.	Average Price, 1911.	Total, 1911.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Tasmanian Merino rams.........	10	—	16 5 6	8 8 0	13 13 0	12 0 5	120 4 6
Rambouillet rams	6	—	11 11 0	3 13 0	20 11 7	8 0 1	48 0 9
Suffolk rams.....	8	—	4 14 6	3 3 0	4 19 3	4 1 4	32 11 0
Persian rams.....	6	—	2 2 0	1 1 0	—	1 15 10	10 15 3
Goats.—							
Angora rams.....	9	—	6 6 0	2 2 0	—	4 6 4	38 17 0
Pigs.—							
Berkshire.........	37	—	13 13 0	3 3 0	7 11 10	7 15 1	286 18 3
Berkshire.........	—	1	—	—	—	—	19 19 0
Large Black	29	—	14 3 6	3 3 0	7 14 7	9 5 0	268 5 6
							£825 11 3

SUMMARY OF YEARLY AVERAGE PRICES.

	Average Price, 1905.	Average Price, 1906.	Average Price, 1907.	Average Price, 1908.	Average Price, 1909.	Average Price, 1910.	Average Price, 1911.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Horses.							
Clydesdale stallion..........	—	—	—	—	100 16 0	49 17 6	—
Thoroughbred colts........	—	—	—	—	—	—	76 13 0
Cattle.—Bulls.							
Imported......	40 13 9	45 13 6	42 0 0	25 14 6	—	31 10 0	—
Bred on farm..	35 7 7	42 11 6	57 10 4	48 3 8	57 19 9	49 17 3	62 10 3
Sheep.							
Shropshire rams and ewes....	—	—	—	—	—	2 2 0	—
Suffolk rams, imported....	—	—	—	10 17 5½	—	—	—
Suffolk rams, bred on farm	—	—	—	—	—	4 19 3	4 1 4
Rambouillet Merino rams, bred at Standerton and Ermelo......	—	—	—	8 10 0	—	20 11 7	8 0 1
Rambouillet Merino rams, imported....	—	—	—	9 9 0	—	—	—
Tasmanian Merino rams....	—	—	—	—	—	13 13 0	12 0 5
Persian rams...	—	—	—	—	—	—	1 15 10
Pigs.							
Boars and sows, bred on farm	—	4 7 9	3 9 3½	4 3 5	4 18 6	7 3 11	8 8 3
Boars and sows, imported....	—	—	—	9 9 0	8 8 0	—	19 19 0
Goats.							
Angora rams...	—	—	—	—	—	—	4 6 4

DISTRICT SUMMARY.

District, etc.	Stock Purchased. Stallions.	Bulls.	Rams.	Angora Rams.	Pigs: Boars and Sows.	Total Value.
						£ s. d.
Bethal	—	2	—	—	—	117 12 0
Ermelo	—	2	2	—	2	114 19 6
Heidelberg	—	4	1	—	2	243 12 0
Lichtenburg	—	—	1	—	5	59 17 0
Middelburg, Transvaal Province	1	2	7	2	2	205 0 6
Potchefstroom (including Klerksdorp)	—	4	8	2	4	473 0 6
Pretoria	—	—	—	3	6	60 7 6
Rustenburg	—	2	2	—	—	90 16 6
Standerton	2	4	—	—	2	370 13 0
Wakkerstroom	—	1	—	—	3	155 18 6
Waterberg	—	—	4	—	—	12 1 6
Witwatersrand	—	2	—	—	5	223 7 9
Wolmaransstad	—	1	2	—	1	85 11 6
Zoutpansberg	—	1	—	—	—	42 0 0
Provinces.—						
Cape	—	—	1	—	1	22 11 6
Natal	—	3	1	2	—	108 3 0
Orange Free State	—	—	—	—	35	320 5 0
TOTALS	3	28	29	9	68	£2805 17 3

Notes on Soil Moisture.

By Dr. C. F. JURITZ, Acting Chief of the Division of Chemistry.

WE can scarcely imagine a soil, in its natural condition, entirely free from water. Such a soil would be that of an absolute desert. When speaking of the cultivation of "dry" lands, one of course employs the adjective in a relative and very elastic sense, for long ere the moisture in any soil has diminished to a point approximating to *real* dryness, such a soil would altogether cease to support vegetable life. In just *so* far the term "dry farming" is, as Professor C. G. Hopkins, of Illinois, has said,* and as Senator McColl, of Victoria, has repeated,† a misnomer.

And so we may confidently select one of our hottest days, proceed to the most arid tract of country within the Union, take thence a cubic foot of surface soil, bring it into the laboratory, and determine its moisture content; we may take it for granted that such a block of soil will be found to contain a quantity of water that is quite appreciable. True, the mere surface skin—if one may use the term—of the soil may contain next to no water at all, but penetration below the surface will almost assuredly reveal a less parched condition of soil, if not to the eyes, at all events by means of our chemical and physical appliances.

The proportion of water which we thus discover in a soil may be small relatively to the needs of the crop—so small, indeed, that the crop manifests the fact by wilting, and yet in absolute weight it may be very considerable. The wilting of a crop does not indicate that the soil moisture is *beginning* to give out; it means that the *last stages* of endurance are being reached so far as the plant is concerned. Yet, within one foot of the surface, above which, say, a morgen of wheat is drooping, there may be as much water as would cause an 8000-gallon tank to overflow, or, to take weight instead of measure, one morgen of that soil may contain, to a depth of twelve inches, more than forty tons of water, and yet the crop may be dying of thirst. If we accept as statements of fact the figures just quoted, one needs hardly to add that the average proportions of water contained in a South African soil—whether cultivated or veld—are far in excess of these numbers. Of this I propose to give some proof later on.

Since, then, there is no cultivable soil absolutely void of water, we may consider that there are three possibilities of quantitative relationship between water and soil. There may be a surplus of

* "Soil Fertility and Permanent Agriculture", p. 579.

† Report First Inter-State Dry-Farming Conference, South Australia, pp. 58, 149.

water, or there may be just the right amount, or else there may be a deficiency. These are the terms we use when we consider the *ratio* of water to soil; but we may look at the subject in another way and say that there are three conditions under which water is present in the soil.* As a pure matter of convenience, we may give a distinctive name to each of these conditions and say that the water may be there as

(1) free water;
(2) capillary water;
(3) hygroscopic water.

These correspond respectively with the three degrees of relation just mentioned, free water involving a surplusage, hygroscopic water a lack, and capillary water the normal state of plant growth.

In each of these three conditions, the subject of soil water opens great vistas of investigation to the soil chemist and physicist in South Africa. Hitherto, in no part of the Union has there been any investigation worth speaking of in this connection except as regards the hygroscopic water in our soils. With that phase of the subject it is my intention to deal specially in the present paper, but a few introductory words are necessary with respect to what are called free water and capillary water, partly on account of their inherent importance and claim to fuller investigation than has been given them in the past, and partly because we cannot rightly understand what I shall have to say about hygroscopic soil water until we have at least glanced at the other two phases.

Free water may be described as water which does not form an integral part of the soil. The term is applied to the water when it completely fills all the pores or air spaces in the soil. When such a state of affairs continues indefinitely, an ordinary land plant must suffer. The circulation of pure air in the soil is essential to the well-being of the plant, and prolonged closing up of these air spaces by means of water, in the presence of organic matter, for one thing, causes an acid condition of the environment of the roots which is bound to exert a pronounced injurious influence on the plant.

After heavy showers of rain, when the soil has been drenched with water, and, relatively to the plant, holds a surplus amount, equilibrium soon begins to be restored by two main processes.† The first of these is the result of gravity. By its own weight the water sinks or gravitates downwards by percolating through the soil, and so free water has also been called gravitational water. When water thus sinks down to the lower levels of the soil, it carries with it from the surface the finer soil particles and so exerts an influence in the direction of making the surface soil coarser in grain than the sub-soil. These fine particles which the descending water carries down are, at the same time, the very portions of the soil that contain plant food in the best available form, and if these are to be restored to the surface, it can be done only by inverting the soil profile, i.e. by an entire interchange of surface and sub-soil.

Another effect of descending water in a soil is that soluble salts are carried downwards from the surface—injurious salts these may

* It must be plain that no *sharp* distinction can be drawn between these conditions.

† It is not necessary to consider surface run-off in this connection, for we are speaking only of the water actually *in* the soil.

be, and, if adequate drainage be provided, such harmful salts may be washed completely out of the soil.

But the restoring of equilibrium is brought about not only by gravitation; it is also greatly aided by evaporation. The surplus of water passes off from the soil into the air in the form of vapour. The quantities of water that are thus driven off are almost incredibly great. Evaporation does not cease when only the surplusage of water is removed, but the soil continues to lose water, and from many a soil under irrigation as much as 50 per cent. of the water put on it passes unused into the air.

The warmer the weather the more rapid the evaporation, and, consequently, the greater the loss to the soil. Experiments carried on in various parts of California during 1903 and 1904 showed that from 66 to 108 inches of water per annum were thus lost to the soil, or more than double the annual rainfall of Capetown's south-eastern suburbs. With respect to the amounts of moisture that South African soils lose by evaporation under different conditions of wind and temperature, we know little indeed. Some interesting experiments were conducted by Mr. R. W. Thornton at Robertson about two years ago, and were published in the *Cape Agricultural Journal* of May, 1910. These experiments need, however, to be pushed considerably further.

Another point worth investigating is how much water any given soil is capable of holding, in other words, the water-retaining capacity of the soil.* This is equal to the maximum amount of water that is left in a soil after all surplusage has either run, drained, or evaporated away. Soil pores filled with water, as already observed, constitute a source of danger to most plants. Hence it becomes desirable to determine how much water will bring about such a condition. This differs in different soils. A simple way of determining it is that of placing a definite quantity of soil in one arm of a U-shaped tube and measuring carefully the volume of water required to drive out the air from the soil pores and take its place.†

Although, when a natural soil has been supersaturated with water, the surplus of water descends in the soil by the power of gravitation, it encounters sufficient friction in the course of its passage downwards through the minute spaces between the soil grains to increase the time of that passage very considerably, and so in a sandy soil, with its comparatively large grains and large spaces between the grains, there is less friction and the water passes down more rapidly than in a clay soil, wherein both the grains and the spaces between them are very minute.

Of course there is no advantage—rather a disadvantage—in supplying to any given cubic foot of soil more water than it is able to hold; this, in the case of most cultivated soils, would range from one-fourth to one-half of a cubic foot of water.

Capillary Water.—The free water in a soil is that excess of water with which the soil parts most readily. It can be seen in the

* Hellriegel's experiments led him to conclude that any soil can supply plants with all the water that they require, and as fast as they require it, provided the quantity of moisture within the soil be not reduced below one-third of the total amount of water that such a soil is capable of holding.

† The determination may also be made by means of Feulling's apparatus; Wiley, "Principles and Practice of Agricultural Analysis", 2nd ed., Vol. I, p. 152.

soil as *liquid* water, while capillary water is not *thus* visible, but only indirectly through the damp appearance which it may give to the soil.

If we for the moment consider the soil to be endowed with conscious intelligence, it may be said that so far from making any effort to retain its surplus water it offers the latter a free passage elsewhere. Only in the fine-grained soils, as indicated above, does friction operate to delay—but even then not entirely to stop—this passage. At length all the water that was free to go has gone; the pores between the grains of soil again become air-filled; but there still remains behind some water which is not free but bound—water which the soil declines to part with so readily as it did with the free gravitational water. This we speak of as capillary water. It occupies in the soil no longer the larger pores or air-spaces, but simply the fine tubes, angles, and nooks in amongst the millions of soil grains, where these grains almost touch each other. Capillary water cannot be removed from the soil by drainage or gravitation, and the capillary action of the fine soil tubes causes the water to move upwards, downwards, laterally, from relatively moist to relatively dry parts of the soil, wherever there are *fine* passages through which it can thus be drawn. Amongst other directions in which the capillary water moves is that towards the surface, where, when heated by the sun or subjected to the action of the wind, the tension between the soil and the water is loosened and the latter evaporates, its place at the surface being continually supplied by the upward movement of more capillary water from below.

The United States Bureau of Soils found that, owing to this upward movement of moisture, the surface soil in arid regions became automatically covered with a mulch which protected it from further rapid loss of water, and this explained the field observations that soils in arid areas, while very dry for the first few inches, retain their moisture at lower depths much more persistently and for greater length of time than do soils in humid areas.*

It is this upward-moving capillary water that, during prolonged dry weather, brings back to the surface the brack salts which the gravitational water had previously carried downwards. It is from this capillary water that the plants derive the moisture which they constantly need, so that, as free water in the soil means water in excess, the presence of no more than capillary water indicates that, at all events approximately, the right amount of moisture is present.

If it is important to know how much water would be required completely to fill the air spaces in a soil, it is also of importance to ascertain the amount of capillary moisture that various soils contain. And just here we must realize this important fact. Plants have the power of withdrawing from the soil and using for their own purposes capillary moisture which gravitation is unable to withdraw, and yet plants cannot thus remove from the soil *all* the capillary water which it contains, but only *some* of it.† So it comes about that a soil may

* Report of the Chief of the Bureau of Soils for 1906, p. 18.

† "A lima bean absorbs something over 100 per cent. of its weight of water during germination. A single large lima bean, introduced into a soil with the water content at or near the drought limit, will completely air-dry a thin layer of soil adjacent to its surface, although the soil as a whole contains as much as 15 per cent. of its weight of water."—U.S.A. Dept. of Agriculture, Bureau of Soils, Bulletin No. 55, p. 15.)

still contain an appreciable amount—even a visible amount—of moisture, while the plants on it are already showing signs of wilting.* This, of course, varies for different soils, and in the opinion of some investigators also for different plants, and so what we have to investigate is the particular amounts of water that best suit the requirements of this or that particular crop on soils of given type. The amount of soil water that best suits any special plant we generally call the *optimum* of moisture for such a plant.† and this optimum varies not only for each kind of crop,‡ but the crop being the same it also varies for different kinds of soil. Assuming these to be facts, then, not only is the optimum of soil moisture for wheat different from that for barley, but the optimum for wheat on a sandy soil differs from the optimum for wheat on a clay soil. Let me go further and say that the optimum for wheat in England may differ widely from the optimum in South Africa, or in the Transvaal from that in Natal, or in the western districts of the Cape, even though there be little difference in the nature of the respective soils. The economical management of water must mean taking account of such points as these and following them to their logical conclusions.

The extreme variations of the optimum moisture for plants in different soils are stated by Whitney to range from "20 per cent. of the weight of dry clay soil, and very much more for peat and muck soils, to 4 per cent. for some sandy soils". Plants may flourish well if the soil water exceeds or falls short of the optimum, provided such excess or deficiency remain within due limits, but if the soil moisture fall below about 80 per cent. of the optimum the drought limit begins to take effect, and, as the water content of the soil diminishes more and more, the plant suffers increasingly and finally collapses. And all this while the soil may still contain capillary water.§

* These points are well illustrated in connection with a Wisconsin soil examined by King ("Physics of Agriculture", p. 135). Clover and maize were showing signs of wilting: the surface soil originally contained 17 per cent. of capillary moisture, whereof they had abstracted about 10 per cent. At a greater depth was a sandy stratum containing originally about 16 per cent. of moisture, of which they had abstracted respectively 7 and 12 per cent. The intermediate layers, which were clayey, had far more effectually resisted the plants' efforts to withdraw moisture from them, as the following table of moisture percentages shows :—

	Clover.	Maize.	Fallow ground.
0–12 in. clay loam	8·44	7·03	17·01
12–24 in. clay	12·84	11·79	19·86
24–30 in. sandy clay	13·52	10·84	18·56
30–43 in. sand	9·53	4·17	15·90

† "It is perfectly well known to agriculturists generally, and greenhouse men especially, that there is a particular water content (or perhaps a more or less narrow range of water content) differing with each soil, at which plants grow best, other conditions being the same. This is popularly known as the 'optimum' water content, and is supposed to be that content from which plants draw most readily their needed supply. . . . The true significance of optimum water content is that particular content at which the soil can be put into the best possible condition for plant growth. The plant can then best draw its needed water from the soil, because all the other factors making for good growth are also at their best. Moreover, an increase in water content in excess of the optimum generally produces a greater detrimental effect on the plant than a decrease below the optimum."—(Cameron & Gallagher, "Moisture Content and Physical Condition of Soils", U.S. Dept. of Agriculture, Bureau of Soils, Bulletin No. 50, p. 8.)

‡ The opinion of some competent to judge is that the optimum moisture content is not a plant problem, but a soil problem, i.e. that it differs for different soils, but not for different plants.—(See Bureau of Soils, Bulletin No. 50, p. 59.)

§ U.S.A. Dept. of Agriculture, Bureau of Soils, Bulletin No. 55, p. 15.

The capillary water in a soil serves as the vehicle by which plant food is conveyed to the roots of crops. It is from the capillary water, too, that the plant finds means to replenish the enormous losses which it daily undergoes by evaporation from its leaf surfaces. This evaporation keeps the plant sufficiently cool during the noonday heat to permit of its vital processes going on, but the evaporation would come to a stand and wilting would ensue unless there were a constant replenishment of water through the roots.

Daily determinations of the amount of moisture in a soil under cultivation would afford absolute knowledge of the moisture conditions under which the crop was growing, and the importance of thoroughly investigating the proportions of moisture in different classes of soil which constitute the optima for different crops needs no further

AVERAGE AMOUNT OF WATER MAINTAINED BY 20 GRAMMES OF SOILS ADAPTED TO DIFFERENT CROPS.

Truck, 6 *per cent.* *Wheat,* 13 *per cent.* *Grass,* 18 *per cent.*

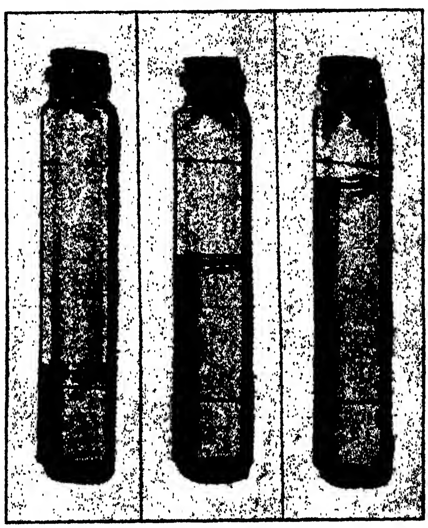

Plate I.—(From Bulletin No. 5 of U.S.A., Division of Soils.)

emphasis. An illustration or two from the United States may nevertheless prove opportune. About sixteen years ago Professor Whitney investigated some typical soils of the Atlantic coast States. He found that stiff clay grass soils, when in favourable condition for crops, contained from 18 to 22 per cent. of water, or about 400 tons of water per acre, within one foot of the surface.* Light, sandy, truck soils, on the other hand, contained only about 5 or 6 per cent. of moisture, or about 100 tons of water per acre. The best wheat lands, again, contained from 12 to 15 per cent. of water (see plate I).

* U.S.A. Department of Agriculture, Division of Soils, Bulletin No. 5, p. 10.

But this variation may also be illustrated as between plants much more closely allied; for instance, to take only tobacco, the heavy limestone soil at Marietta, where the dark wrappers are grown, contain 18 per cent. of water, but the tobacco soils at Poquonock, where the light wrappers are produced, do not contain more than 7 per cent. of moisture.* In such a connection as this it must also be remembered that a plant may obtain all the water it needs from a sandy soil, although the percentage content of moisture in that soil is considerably below the proportion required to sustain the same plant in a clay soil.

For the sake of completeness in view of future investigations, the method of determining the capillary moisture of soils *in situ* is here given. The method adopted for sampling the soil for these determinations is that of Whitney.† A brass tube is provided, 9 inches long and ¾ of an inch in diameter, with a mark 6 inches from the bottom. Such a tube will hold about 50 grammes of soil. The tube is pushed down into the soil to the mark, and the sample of soil removed with the tube. There is but little danger of the sample dropping out of the tube even in sandy soils. When the tube is withdrawn, each end is capped with a rubber finger tip, making a perfectly air-tight joint. The tubes containing the samples can be kept thus for several days without any fear of losing moisture. This method is specially useful in getting samples from observers in different localities, who can enclose several tubes at a time in a cloth sack and send them to the laboratory daily or at stated intervals.

Hygroscopic water.—The water in a soil is either fixed or capable of movement. The free and the capillary water represent the latter condition; hygroscopic water the former. When a soil contains free water it contains water in excess of its requirements; when it contains the proper proportion it does not contain any more than capillary water, but when merely hygroscopic water is present it is certain that there is a very decided deficiency of moisture in the soil. As we have seen, soils part readily with free water; less easily with their capillary water, although plants possess the power of removing, at all events, some of the latter, but to their hygroscopic water the soils cling with great tenacity. Free water fills the whole of the air spaces between the soil grains, capillary water only the recesses and minute channels in those spaces, but hygroscopic water goes no further than to form the merest film round each individual soil grain. The relation between the three is somewhat like that between gases, liquids, and solids. Free water has an unrestrained course through the soil; capillary water is also free to move, but only within certain restricted channels, and at a relatively slow rate; hygroscopic water is rigidly bound to the soil grain that it envelops as by a veil or film. The force that holds that film around the particle of soil is, relatively to the size of the particle, stupendous. Whitney asserts that it is held there by a pressure of 10,000 atmospheres, or fifteen times the muzzle pressure of a 12-inch gun.‡ So strong is the cohesion, that it is quite out of the power of any plant to break it; it can, however, be broken by the application of heat, and this method is made use of in the laboratory to determine the amount of hygroscopic water in a soil. But

* U.S.A. Department of Agriculture, Division of Soils, Bulletin No. 5, p. 18.
† Wiley, "Principles and Practice of Agricultural Analysis", 2nd ed., Vol. I, p. 73.
‡ U.S. Dept. of Agriculture, Bureau of Soils, Bulletin No. 55, p. 11.

even when the connection has thus been broken, so strong is the attraction of the soil grains for moisture that when left to themselves they will withdraw water vapour from the atmosphere, and soon each soil particle will again have surrounded itself with its film of water. Under those circumstances, the reader will understand the remark with which I opened this paper, that a soil in its natural condition entirely free from water is something not to be imagined.

I have already said that soil loses even its capillary water from its surface layer by evaporation, hence if we spread a soil sample out thinly on a sheet of paper, for instance, so that it may become air dry, it will, in the course of some days, lose all its capillary water, and nothing but hygroscopic or film moisture will be left adhering to it. If we take a sample of this air-dried soil, weigh it, heat it in order to drive off the hygroscopic water, and then weigh it again, we shall find out from the loss sustained how much hygroscopic water there was in the soil.

We may here ask what is the precise value of hygroscopic moisture in the soil for cultivated crops. There has been a variety of opinions on this point, and Mayer* went so far as to declare that it had no value whatever, while Whitney proceeds to the opposite extreme. The moderate view is thus summarized by Hilgard:—†

1. Soils of high hygroscopic power can withdraw from moist air enough moisture to be of material help in *sustaining* the life of vegetation in rainless summers, or in time of drought. It cannot, however, maintain normal growth, save in the case of some desert plants.

2. High moisture absorption prevents the rapid and undue heating of the surface soil to the danger point, and thus often saves crops that are lost in soils of low hygroscopic power.

Whitney goes much further, and says that owing to the enormous force with which hygroscopic moisture is held by the soil grains, and the high concentration of dissolved mineral salts due to this stress, it undoubtedly plays an important part in the chemical changes which take place.‡

Loughbridge§ found almond trees in good condition in one part of a field where there was 6.6 per cent. of hygroscopic and 1.9 per cent. of capillary moisture in the soil. In another part of the identical field, where the soil contained 6.9 per cent. of hygroscopic and only 1 per cent. of capillary moisture, they were suffering. On a red loam soil peaches were in good condition with a hygroscopic moisture content of 5 per cent. and a capillary moisture percentage of 3.2. Elsewhere, where the soil and its percentage of hygroscopic moisture remained the same, but the capillary moisture was only 1.8 per cent., the peaches were poor.

On a previous page the remark was made that plants may already begin to wilt on a soil which still contains a noticeable amount of capillary moisture. This was clearly demonstrated in an investigation recorded by Heinrich,‖ who determined (1) the percentage of water required to saturate completely several soils, (2) the percentage of water contained in the same soils when the plants growing on them began to wilt, and (3) the percentages of hygroscopic water

* "Agrikulturchemie", Vol. II, p. 131.
† "Soils: their formation, properties, etc.", p. 200.
‡ U.S. Dept. of Agriculture, Bureau of Soils, Bulletin No. 55, p. 16.
§ Hilgard, "Soils", p. 214.
‖ Zweiter Ber. Landw. Versuchsstation, Rostock, 1894, p. 19.

that these soils contained after removal of all their capillary moisture. The following are the figures thus obtained:—

Description of Soil.	Percentage of Water At Saturation.	When Plants began Wilting.	Hygroscopic.
Coarse sand	26.5	1.5	.42
Moderately fertile garden soil...	43.9	4.6	1.68
Sandy loam	43.3	7.8	2.40
Very fertile calcareous soil... ...	38.3	9.8	3.65
Peat soil	274.0	49.7	20.6

Continuing his experiments with a variety of field crops on two soils, Heinrich found that the water percentages in the respective soils, when wilting set in, were as follows:—

	On Calcareous Soil.	On Peaty Soil.
Oats	8.40	32.3
Barley	9.98	33.3
Rye...	9.55	32.8
Red clover	10.28	34.3
Potatoes	5.07	31.4

For several years past, determinations of hygroscopic moisture in soils have continually been carried on in the Agricultural Department's laboratories at the Cape and in Pretoria, and I am therefore in a position to tabulate nearly 1300 such determinations in the case of Cape and Transvaal soils. In both Provinces these determinations formed part of a fuller series of tests applied to the soils under examination, and as there is very often a clear relation between the proportion of hygroscopic moisture in a soil and the quantities of organic substances present, I have extended the tables so as to include some details respecting these organic constituents. In the following tables I have grouped the soils of the two Provinces according to the fiscal or magisterial divisions or districts, inasmuch as circumstances render a more scientific grouping impracticable. In those districts there are, of course, great varieties of soil, but it has not been possible to sort these out, so that the most that can be done is to state the number of soils from each district in which determinations of hygroscopic moisture have been made, and the maximum, minimum, and average percentages of hygroscopic water found in the soils of each separate district. Of course it must be understood that the proportions of water shown in the table are those in the air-dried soil; they do not represent the soil either in its normal condition, *in situ*, nor are they at all representative of the soil after a heavy shower of rain; in other words, the percentages recorded are those of hygroscopic, not of capillary, nor of free water. It may also be stated that the Cape Province soils tabulated below are those dealt with in my book on "The Agricultural Soils of Cape Colony", while the table of Transvaal soils comprises all those analysed by the staff of the Pretoria Laboratory up to the 30th June, 1910.

TRANSVAAL.

Magisterial District.	No. of Samples examined.	Maximum percentage of Water in Soil.	Percentage in Soil containing maximum amount of Water. Organic Matter.	Nitrogen.	Minimum percentage of Water in Soil.	Percentage in Soil containing minimum amount of Water. Organic Matter.	Nitrogen.	Average percentage of Water in Soil.
Barberton	41	9·76	9·08	·151	·42	1·91	·058	2·44
Bethal	4	5·90	7·04	·122	3·24	5·34	·116	4·86
Bloemhof	15	5·15	20·48	·396	1·02	1·58	·051	2·49
Boksburg	5	4·86	6·74	·118	1·01	3·52	·053	2·10
Carolina	10	13·44	14·96	·504	1·53	10·64	·143	4·99
Ermelo	13	11·01	15·05	·302	1·31	6·87	·137	4·52
Germiston	12	7·56	9·65	·158	·69	2·98	·069	2·38
Heidelberg	17	4·56	5·33	·094	·45	4·35	·091	2·09
Johannesburg	15	10·25	25·22	1·064	·47	1·22	—	1·82
Krugersdorp	22	10·47	11·90	·160	·21	2·06	·035	3·80
Lichtenburg	21	9·53	14·53	·221	·46	1·63	·035	3·49
Lydenburg	12	6·52	9·72	·095	·32	1·33	·030	3·75
Marico	15	3·24	7·31	·119	·49	2·47	·046	1·59
Middelburg	20	13·86	19·34	·468	·15	6·16	·099	2·53
Piet Retief	8	5·04	7·13	·135	·35	2·66	·061	2·30
Potchefstroom	49	9·22	14·06	·168	·50	1·12	·014	3·69
Pretoria	95	19·13	58·30	1·306	·28	1·03	·033	3·15
Rustenburg	67	8·52	6·80	·098	·31	2·23	·028	2·29
Standerton	23	7·61	5·84	·088	·61	4·94	·100	2·45
Wakkerstroom	7	7·31	15·09	·284	1·99	7·08	·162	4·49
Waterberg	34	8·85	10·88	·127	·18	·72	·027	2·35
Wolmaransstad	10	7·78	8·79	·091	·81	1·79	·042	2·47
Zoutpansberg	24	20·19	25·87	·660	·36	1·00	·028	4·15
Entire Transvaal	539	20·19	25·87	·660	·15	6·16	·099	2·94

CAPE.

Fiscal Division.	No. of Samples examined.	Maximum percentage of Water in Soil.	Percentage in Soil containing maximum amount of Water. Organic Matter.	Nitrogen.	Minimum percentage of Water in Soil.	Percentage in Soil containing minimum amount of Water. Organic Matter.	Nitrogen.	Average percentage of Water in Soil.
Albany	3	·88	5·62	—	·59	5·97	—	·70
Albert	3	3·46	4·42	·070	2·10	2·68	·014	2·67
Aliwal North	4	5·08	4·73	·098	3·23	3·66	·098	4·00
Barkly West	13	6·82	5·64	·070	·63	1·47	.028	2·19
Beaufort West	1	2·57	5·15	·196	2·57	5·15	·196	2·57
Bredasdorp	22	1·80	8·08	·16	·38	2·36	·170	1·10
Butterworth	7	4·77	10·04	·217	1·74	3·69	·056	3·26
Caledon	40	5·22	11·45	—	·34	1·26	·080	1·37
Cape	62	5·76	14·97	·189	·05	·17	·049	1·61
Carnarvon	2	6·25	6·58	·084	2·43	3·48	·070	4·34
Cathcart	28	2·78	5·82	·126	·55	1·90	·070	1·56
Ceres	7	1·33	5·48	·102	·27	1·41	·084	·64
Clanwilliam	3	2·10	8·60	—	·67	6·42	—	1·23
Colesberg	6	4·40	6·51	·165	2·33	3·84	·101	3·06
Elliot	4	8·20	19·67	·263	·99	4·38	·074	3·44
Fort Beaufort	4	3·49	10·50	·442	2·20	4·05	·102	2·83
George	26	2·84	7·37	·168	·44	2·87	·098	1·22
Gordonia	2	3·23	3·49	·052	1·68	2·05	·022	2·96
Graaff-Reinet	3	2·93	3·32	·175	2·56	3·20	·154	2·74

Fiscal Division.	No. of Samples examined.	Maximum percentage of Water in Soil.	Percentage in Soil containing maximum amount of Water.		Minimum percentage of Water in Soil.	Percentage in Soil containing minimum amount of Water.		Average percentage of Water in Soil.
			Organic Matter.	Nitrogen.		Organic Matter.	Nitrogen.	
Hanover..........	6	7·35	—	—	1·94	3·21	—	4·73
Herbert..........	3	3·00	6·01	·098	1·79	3·24	·049	2·20
Hopetown........	2	7·20	4·24	·057	3·96	3·02	·050	5·58
Humansdorp......	4	4·12	7·46	—	1·36	4·07	·140	2·91
Idutywa..........	1	2·44	5·18	·133	2·44	5·18	·133	2·44
Kenhardt.........	5	5·80	5·22	—	1·90	2·88	·071	3·77
Kimberley........	6	6·29	5·07	·106	·59	1·17	·035	3·54
Kingwilliamstown.	1	6·26	16·60	·315	6·26	16·60	·315	6·26
Knysna..........	19	3·84	12·21	·413	·56	1·71	·067	1·53
Komgha..........	27	6·30	15·18	·245	·69	2·34	·098	2·53
Ladismith........	16	4·04	6·94	·161	·61	4·06	·057	1·28
Maclear..........	1	1·75	9·18	—	1·75	9·18	—	1·75
Mafeking.........	2	1·78	4·53	·042	·93	2·99	·056	1·36
Malmesbury.......	71	7·25	9·26	·140	·14	1·07	·050	1·05
Middelburg.......	1	1·86	—	—	1·86	—	—	1·86
Mossel Bay.......	20	6·95	10·24	·17	·37	1·66	·016	2·10
Mount Currie.....	4	6·22	20·40	—	1·16	3·56	·028	3·72
Mount Frere......	2	17·67	14·71	·168	7·13	7·20	·287	12·40
Oudtshoorn.......	19	3·73	4·33	·070	·33	·85	·070	1·52
Paarl............	54	3·79	9·96	·174	·17	1·01	—	1·11
Piquetberg........	2	1·47	3·80	·140	·72	7·49	—	4·48
Port St. Johns....	1	2·73	16·5	·240	2·73	16·5	·240	2·73
Prieska...........	4	5·99	14·81	·099	2·83	1·89	·056	4·35
Queenstown.......	6	4·41	7·45	·119	1·34	2·68	·046	2·30
Richmond........	2	1·73	4·48	·231	1·63	5·12	·245	1·68
Riversdale........	24	4·35	5·95	·084	·82	2·47	·030	2·34
Robertson........	34	2·85	3·35	·056	·21	1·21	·028	1·19
St. Marks.........	4	5·38	4·95	·119	1·39	2·69	·091	2·48
Somerset East....	3	4·34	13·54	·293	2·81	5·65	—	3·79
Stellenbosch.......	17	2·49	7·25	·101	·10	1·27	—	·80
Steynsburg........	19	6·52	4·33	·025	2·86	2·46	·031	4·60
Stockenstrom.....	5	4·34	7·39	·20	1·75	3·12	·088	2·61
Swellendam.......	38	4·82	4·07	·077	·09	·77	·110	1.35
Tulbagh..........	9	5·75	10·09	·088	·27	1·61	·043	1·70
Uitenhage........	11	3·13	6·46	·173	·79	2·56	·091	1·47
Umtata...........	2	4·12	14·18	·147	3·39	16·06	·238	3·76
Umzimkulu.......	3	7·71	11·42	·084	7·41	12·18	·203	7·54
Uniondale........	12	1·78	4·72	·161	·65	2·44	·140	1·04
Victoria East.....	1	5·87	10·72	·182	5·87	10·72	·182	5·87
Vryburg...........	16	13·56	38·22	1·435	·51	1·31	·028	2·65
Willowmore.......	1	2·55	4·87	·077	2·55	4·87	·077	2·55
Willowvale........	4	3·03	8·72	·203	1·94	6·36	·147	2·61
Wodehouse.......	3	10·08	10·75	·344	5·94	6·05	·158	7·65
Worcester.........	30	3·80	6·85	·137	·17	·44	·036	1·27
Entire Cape Province..........	755	17·67	14·71	·168	·05	·17	·049	1·87

Here and there in the columns headed "organic matter" in the above tables small proportions of carbon dioxide, resulting from the breaking up of calcium carbonate during ignition, may also be included, but as a rule this is not the case, and where it is, the discrepancy introduced is probably immaterial.

One glance at the tables is sufficient to demonstrate that the soils which contain the maxima of water for any district usually also contain much larger quantities of organic matter in general, and of nitrogen

in particular, than are contained in those soils in which the proportion of water for that district is least. In every one of the twenty-three Transvaal districts, it will be seen, the soil which has most water contains more organic matter than the soil in that district which contains the minimum of water; and, except in the single case of Standerton, all the soils of maximum water content also contain more nitrogen than the soils of minimum water content. The fact is that the presence of organic matter in a soil helps the latter very materially to retain moisture, a fact of great importance for areas of scanty rainfall. Amongst the Cape soils there are five districts out of sixty-three that afford exceptions to the rule that more organic matter is found in soils of maximum than in soils of minimum water content. Those exceptions are Albany, Graaff-Reinet, Piquetberg, Richmond, and Umzimkulu; but from three of these districts, Albany, Graaff-Reinet, and Umzimkulu, only three soils each were taken for examination; from the other two districts only two soils each. So we may safely conclude that with a fuller investigation of the soils of those five districts they will cease to be exceptions to the general rule.

If we take from each of the twenty-three Transvaal districts the soils in those districts which respectively contain most hygroscopic water, we shall find that the average percentage of water in those twenty-three soils is 9.12. The average percentage of organic matter in the same twenty-three soils is 14.31, and the average percentage of nitrogen .214. On the other hand, the twenty-three soils of the several Transvaal districts which show the minima of water have an average moisture content of only .75 per cent., i.e. less than one-twelfth of the moisture content in the average maximum. These twenty-three minimum soils show an average organic matter content of 3.25 per cent., and an average nitrogen content of .066 per cent. In the soils containing the maxima of water, 1½ per cent. of the organic matter consists of nitrogen; in those containing the minima this ratio is higher, namely, 2 per cent.

As to the sixty-three soils which represent the maximum percentages of moisture in each of the Cape Province divisions, we find that they contain on an average 4.67 per cent. of water, or a shade over half the Transvaal average maximum. In these Cape soils of maximum water content the average percentage of organic matter is 8.84, and of nitrogen .131, in both respects less than in the corresponding Transvaal soils. Turning now to the sixty-three Cape soils containing the minimum proportions of water, their average moisture content is 1.75 per cent., and their percentages of organic matter and of nitrogen are respectively 4.09 and .098. That these last three figures are all higher than the corresponding percentages for the Transvaal soils is probably due to the fact that they are higher than would have been the case if more analyses had been undertaken of the soils in some of the Cape districts. In the Cape soils, as in the soils of the Transvaal, about 1½ per cent. of the organic matter in those containing the maxima of moisture consists of nitrogen, but in the soils of the Cape Province wherein the minimum amounts of moisture were found, nitrogen constituted about 2½ per cent. of the organic matter.

If we compare the relative proportions of hygroscopic moisture in the soils of the two Provinces, we find the mean percentage of moisture in those of the Transvaal to be 2.94, compared with an average of 1.87

in the Cape Province.* The soils of only one of the Transvaal districts contain on an average less than 1¾ per cent. of hygroscopic moisture. That district is Marico, represented by fifteen soils. In the Cape Province as many as twenty-four districts average less than 1¾ per cent. of water in the soils examined, and of these twenty-four districts no less than nineteen constitute the belt extending along the coast from Clanwilliam to Albany—a belt of from fifty to one hundred miles in width, and stretching over about six hundred miles of coast line. The divisions concerned are as follow:—

Division.	Number of Samples examined.	Average percentage of Hygroscopic Water.
Clanwilliam	3	1.23
Malmesbury	71	1.05
Cape	62	1.61
Stellenbosch	17	.80
Paarl	54	1.11
Tulbagh	9	1.70
Ceres	7	.64
Worcester	30	1.27
Robertson	34	1.19
Caledon	40	1.37
Bredasdorp	22	1.10
Swellendam	38	1.35
Ladismith	16	1.28
Oudtshoorn	19	1.52
George	26	1.22
Uniondale	12	1.04
Knysna	19	1.53
Uitenhage	11	1.47
Albany	3	.70

The average percentage of hygroscopic water contained in the 493 soils which represent those nineteen coastal districts is 1.26; in the remaining 262 Cape Province soils examined, the average is much higher, namely, 3.03 per cent.

These nineteen districts, as a glance at a map of the Cape Province will show, comprise the whole of the coastal belt indicated, with the exception of Piquetberg, which has not yet been sufficiently fully investigated, and two patches abutting on the south coast. The soils of these patches seem more absorptive of hygroscopic moisture than those of the surrounding districts. The Divisions of Riversdale and Mossel Bay make up one such patch and Humansdorp the other. The last-named division, like Piquetberg, may, after more thorough investigation, fall into line with the adjacent divisions, but for the soils of Riversdale and Mossel Bay another explanation may possibly be forthcoming.

Leaving for a while this coast belt with its soils of low moisture content—a belt of country, by the way, which, in some portions at least, receives more rain than almost any other part of South Africa—let us look at some other tracts not so favourably situated as regards rainfall. Two such areas may be considered, one in the Cape

* This would mean that the average Transvaal soil when air-dried contains about 118 tons of hygroscopic water per morgen, and the average Cape soil 76 tons. In their normal condition these quantities would be greatly increased by the capillary moisture in the soil.

Province and one in the Transvaal. From the extensive area covered by the Cape Districts of Steynsburg, Hanover, Colesberg, Carnarvon, Hopetown, Prieska, and Kenhardt—a decidedly arid stretch of country with a rainfall in parts thereof not greatly exceeding, if at all, 5 inches per annum, extending over 400 miles from south-east to north-west—forty-four soils in all were collected for examination. The average percentage of hygroscopic moisture in these forty-four soils is as high as 4.32, or nearly 3½ times as much as the coast belt average; and yet, when we consider them in regard to rainfall, we speak of these northern parts of the Cape Province as the country's dry lands.

Amongst the analyses made in the Pretoria Laboratory, thirty-four represent the adjoining Districts of Wakkerstroom, Ermelo, Carolina, and Bethal. The average amount of hygroscopic moisture present in these thirty-four soils was found to be 4.63 per cent. And in Lichtenburg, the district in possession of a dry-land station, analyses of twenty-one air-dried soils for their moisture content yielded an average of 3.49 per cent.

What is the explanation of this seeming anomaly? The fact is that the coast belt soils, although they receive more rain, part with it more readily, while those inland soils, which receive little moisture, retain that little tenaciously. This is of course due to the character of the soil itself. If we look at a geological map of the Cape Province we shall see that the nineteen districts whose soils contain so little moisture are almost exactly co-extensive with the pre-Karoo geological formations, and regarding the physical make-up of the soils derived from these formations, I have already pointed out elsewhere* that there is a marked difference in fineness of texture between the soils of these geological formations and the Karoo soils. Exactly the districts whose soils I have now shown to contain least hygroscopic moisture are, as I there pointed out, the districts whose soils are of the coarsest texture. If we consider a soil all of whose particles are capable of passing through a ½ mm. sieve to possess a fineness of 100, then the fineness of the coast belt soils may be represented by about 74, while that of the Karoo soils is well over 90.†

So we see that the coarser soils lose their moisture very rapidly, no matter how much they may receive to start with, and dry out, while the finer soils retain the little moisture which they receive. Here, again, we find one of nature's compensating processes at work, for, ultimately, it is the rain that makes a soil coarse. As I have before pointed out,‡ the rain, as it penetrates the soil, continually carries downwards the finer soil particles, and so, little by little, increases the coarseness of the surface layers. In arid districts, on the other hand, as Hilgard well observes,§

> The light rains cannot produce any such washing effect, and hence the sand grains remain incrusted with the products of either their own decomposition or that of neighbouring particles. . . . This fundamental difference at once explains why, in the arid regions generally, sandy soils are found so highly productive that, owing to their easy cultivation, they are preferred to the clayey lands, in which tillage and irrigation are more difficult. It is a well-known fact that on the "sands of the desert", when either irrigated or wetted by rain, vegetation at once springs up with remarkable luxuriance.

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* "Agricultural Soils of Cape Colony", pp. 195, 196.

† The soils of the Riversdale and Mossel Bay Divisions, which do not fit in with those of the Divisions adjacent in respect of their moisture content, are also singular from a geological point of view. To a large extent they are derived, not from the pre-Karoo formations, but from the Uitenhage series.

‡ "Agricultural Soils of Cape Colony", p. 172.

§ "Soils: their formation, properties, etc.", p. 386.

Hilgards remarks of course refer also to the value as plant food of the particles which descending rain washes down from the surface soil, but apart from this, and viewing them merely as particles fine or coarse without any reference to their nature, we see that continuous and excessive rain lessens the power of the surface soil to retain moisture, while absence of rain tends to leave the soil in possession of that power.

All this has been said with direct reference to the hygroscopic water in a soil, which has, however, been regarded of but small value to plants; but be that value small or large, the tendency of a soil to retain capillary moisture is dependent upon the same conditions as its tendency to retain hygroscopic moisture, and about the undoubted value of capillary moisture for plants there can be but one opinion. One thing we must persistently remember: plants *cannot* do without water, and if in an arid region they do not get it from the soil, and if the soil is so coarse in texture that it does not even condense a sufficiency of hygroscopic moisture from the air upon the surfaces of the soil particles, the crops must inevitably wilt and collapse. The principles of dry-farming, as far as they can be practically applied, are not so applied in absolute independence of the presence or absence of water, but are based upon a proper conservation and utilization of that water which is present in the soil.

Now, as pointed out above, fineness of soil texture is one of the means of keeping the moisture in the only place where in a dry area the plants are likely to get it, but wherever in a soil that fineness of texture prevails, thither capillary action will take the soil moisture. If that fineness of texture prevails on the immediate surface of the soil, the capillary water will travel thither too and thence evaporate into the air. Hence the practice of mulching the soil surface, a practice which confines capillary action to the *lower* layers and so hinders evaporation from the surface. On the other hand, it would be attempting the impossible to follow the practice of dry-farming on a soil which is throughout its whole profile too coarse to retain the little moisture which the clouds give it.

But the fineness of texture of a soil is not the only property which predisposes it in the direction of being retentive of moisture. As I have already indicated by means of the tabulated results, the power to retain moisture usually goes hand in hand with the presence of a fair proportion of organic matter in the soil. In other words, a sufficiency of organic matter not only provides the soil with nitrogen, but, other things being equal, it anchors the moisture more firmly to the soil, and when, under such circumstances, a vigorous growth of vegetation is produced, it is due to the combined effect of the soil texture, the nitrogen in the organic matter, and the capillary moisture in the soil.* The importance of the presence of organic matter in a soil situated in a dry region is such that Stockbridge† ascribes thereto, along with the fineness of division of this organic matter, the function of a determining factor in direct proportion with which the absorption and retention of atmospheric moisture by the soil is regulated during dry weather.

If we look at the Transvaal soils of the foregoing table we find that, as a rule, the black and vlei soils have shown maxima percentages

* See also Wiley, "Principles and Practice of Agricultural Analysis", Vol. I, p. 9

† "Rocks and Soils", p. 155.

of water and the red sandy soils minima percentages. Take the maximum column first, and there we find that the samples representing Bethal, Bloemhof, Ermelo, Germiston, Krugersdorp, Lichtenburg, Potchefstroom, Pretoria, Rustenburg, Standerton, Waterberg, Wolmaransstad, and Zoutpansberg were all black or approaching black, some of them being even peaty, while the Carolina, Johannesburg, Middelburg, and Wakkerstroom specimens were all vlei soils. On the other hand the Piet Retief soil was brick red, and the Lydenburg soil was also red. In this series of soils we have exemplified both the presence of organic matter and the fine texture of the vlei soil as resulting in a high moisture content. Then turn to the column showing the minima proportions of water, and there we notice that red—or reddish—soils represent the Districts of Bethal, Bloemhof, Boksburg, Carolina, Germiston, Lichtenburg, Middelburg, Pretoria, and Rustenburg, some of these being not only red but sandy as well, while sandy soils, not exactly red in colour, are here representative of the Districts Barberton, Krugersdorp, Marico, and Wolmaransstad. So in the twenty-three Transvaal districts we have the contrast of seventeen soils either alluvial ("vlei") or black, on the one hand, with thirteen, either sandy or red, on the other; the former containing the maxima and the latter the minima proportions of hygroscopic moisture for their respective districts. Where the practice of dry culture is an inevitable necessity, the balance would naturally tend in favour of soils of the former types.*

The principle that operates to make some soils more retentive of moisture than others—whether that moisture be capillary or merely hygroscopic—is fundamentally that of the relative sizes of the soil particles. The smaller these particles are the larger will be, within a given volume of soil, the aggregate of surfaces which they present for the formation of films of hygroscopic moisture around them. For this reason there is apt to be more hygroscopic moisture in a fine-grained than in a coarse-grained soil.† Somewhat similar is the principle that operates with regard to capillary moisture. The soil particles as they lie on each other constitute a network of extremely fine tubes within which the moisture is retained by surface tension, and by means of which it travels up and down and about the soil. The finer those tubes, the closer do they hold the water, and hence fine-grained soils are much more tenacious of their capillary water than soils of coarse texture. The texture of the soil is, therefore, an index of its behaviour in relation to moisture in the field. For this reason, amongst others, there is a texture of soil which may be regarded

* An ideal soil for what is termed "dry-farming" (or farming with limited rainfall) is one that possesses a surface layer easily penetrable by rains, a layer that would practically allow of their ingress by the law of gravity and prevent this moisture returning by capillarity, and one that would absorb the least possible amount of moisture. It should also be light in colour. Below this layer there should be one of much greater thickness of such a structure as to allow considerable quantities of moisture to be conserved therein and freely penetrated by roots. Below such should be a comparatively impervious layer to prevent undue waste of soil moisture by percolation, and absorbent in the upper portion to assist in the conserving of moisture. Such a soil in practice would be most nearly approached by one with a sandy surface, a loam sub-surface, and a clay sub-soil.—(R. W. Peacock, manager, Bathurst Experiment Farm, N.S.W., on "Australian Dry-Farming" in Report of First Inter-State Dry-Farming Conference, South Australia, 1911, p. 91.)

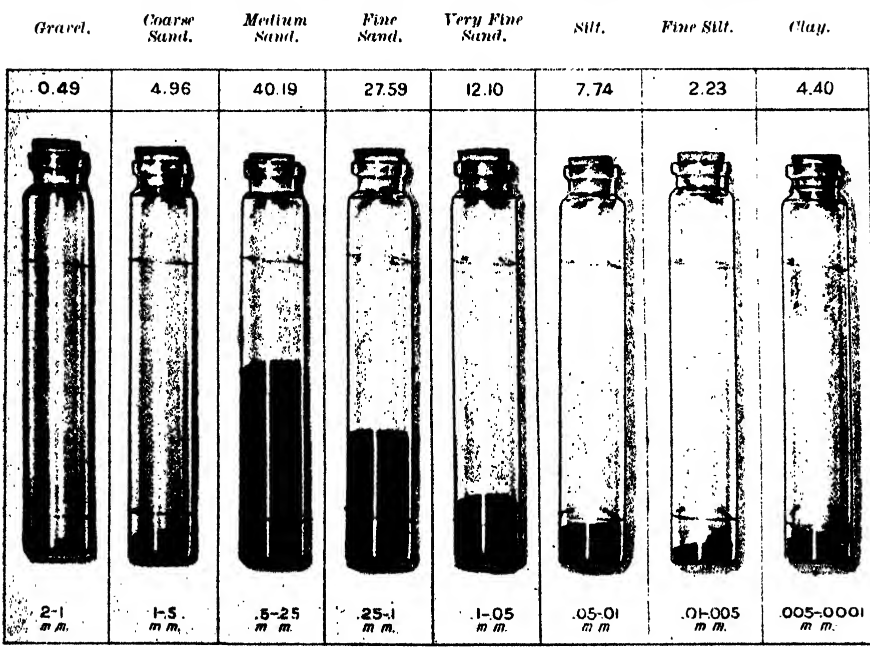
† In King's experiments, quoted on a former page, the reason why the clover and maize failed to extract a sufficiency of moisture from the clayey layers in the soil was probably that most of the moisture in those clayey layers was merely hygroscopic.

as the optimum for certain plants exactly as there is an optimum proportion of soil moisture for such plants. How this works out in practice I have shown by some photographs reproduced from Bulletin No. 5 of the United States Department of Agriculture, Bureau of Soils. One of these (see Plate II) shows the texture of a typical truck soil from Maryland. The various soil grades have been separated from each other by sifting, and placed in separate tubes. It will be seen

THE TEXTURE OF A TYPICAL TRUCK LAND OF THE COLUMBIA FORMATION AT MARLEY, MARYLAND.

No. 472.

Per cent. of Gravel, Sand, Silt, and Clay in 20 Grammes of Sub-soil.



DIAMETER OF THE GRAINS IN MILLIMETRES.

Plate II.—(From Bulletin No. 5 of U.S.A., Division of Soils.)

that in this case medium and fine sand together make up nearly 68 per cent. of the total soil. This soil, as it stood in the field, contained 6 per cent. of water, and it is the same truck soil whose water content is compared with that of two others in Plate I. The second soil referred to in Plate I was a typical Maryland wheat soil of much finer texture, silt and clay forming 35 per cent. thereof, together with 31 per cent. of very fine sand, finer than in the case of the truck soil. The texture of this typical wheat soil is illustrated on Plate III. This soil contained 13 per cent. of capillary moisture. Plate IV illustrates a soil of still finer texture and still higher capillary moisture content—a typical Maryland grass soil, of which clay, the finest grade of all,

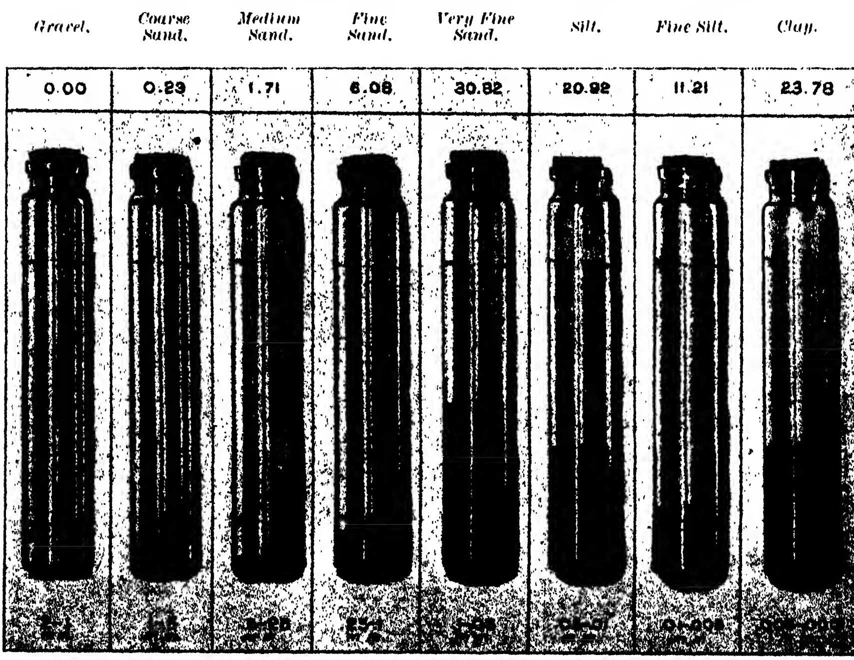
constitutes over 51 per cent., together with nearly 24 per cent. of silt. This very fine grained soil contained 18 per cent. of capillary moisture. The manner in which the proportions of moisture in these three typical soils compare with each other has already been illustrated in Plate I, where it affords a striking presentation of the difference in the water-retaining power of coarser and finer grained soils.

I am anxious to obtain at the earliest opportunity illustrative data of similar facts in relation to typical soils of the Union of South

THE TEXTURE OF A TYPICAL WHEAT LAND OF THE CHESAPEAKE FORMATION AT DAVIDSONVILLE, MARYLAND.

No. 141.

Per cent. of Gravel. Sand. Silt, and Clay in 20 Grammes of Sub-soil.



DIAMETER OF THE GRAINS IN MILLIMETRES.

Plate III.—(From Bulletin No. 5 of U.S.A., Division of Soils.)

Africa. It is, of course, not necessary that the various soil grades should in all cases be thus bottled before we can draw our conclusions from them, either as regards moisture content or as regards the physical fitness in other respects of such soils for specified crops. In my "Agricultural Soils of Cape Colony" I used a similar method of illustration* in comparing the soils of Robertson and the Cape Division, but a modification of this was also used to show the differences in physical composition of typical soils from the Koeberg grain

* See "Agricultural Soils of Cape Colony", illustration facing p. 205.

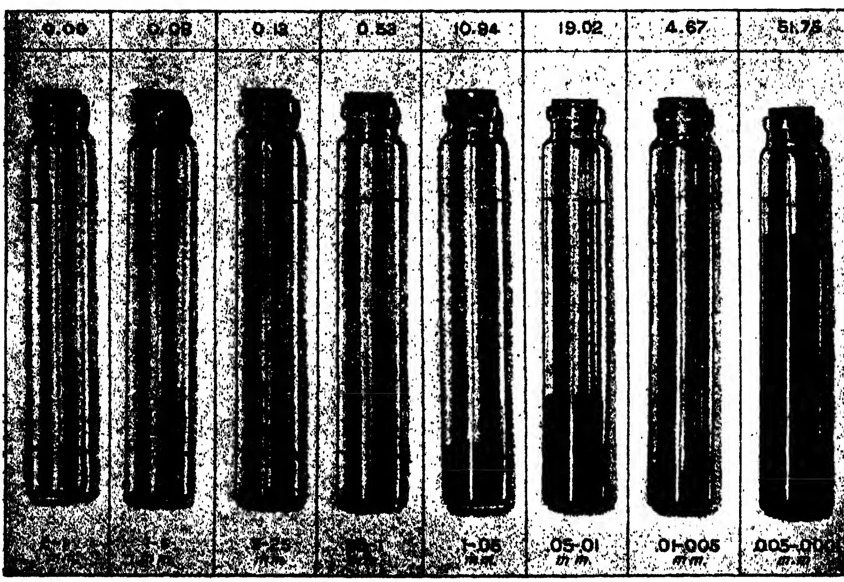
lands, the horticultural soils of Robertson, and the Orange River silts.* The same features may be brought out by simple curves as in my paper on "The study of the soil", contributed to the second volume of "Agricultural South Africa" last year, or, dispensing with graphic methods altogether, the soil texture may be indicated simply by a series of numbers; for instance, the texture curves of the

THE TEXTURE OF A TYPICAL GRASS LAND OF THE TRENTON LIMESTONE FORMATION AT HAGERSTOWN, MARYLAND.

No. 937.

Per cent. of Gravel, Sand, Silt, and Clay in 20 Grammes of Sub-soil.

Gravel. *Coarse Sand.* *Medium Sand.* *Fine Sand.* *Very Fine Sand.* *Silt.* *Fine Silt.* *Clay.*



DIAMETER OF THE GRAINS IN MILLIMETRES.

Plate IV.—(From Bulletin No. 5 of U.S.A., Division of Soils.)

three typical Maryland soils illustrated respectively on Plates II, III, and IV may be given thus with sufficient approximation:—†

Truck soil	$\frac{1}{2}$	5	40	28	12	8	2	4
Wheat soil	0	$\frac{1}{4}$	2	6	31	21	11	24
Grass soil	0	0	$\frac{1}{10}$	$\frac{1}{2}$	11	19	5	52

By this method of notation the Koeberg, Robertson, and Orange River soils above referred to would be thus indicated:—

Koeberg (loam) ...	5	4	4	9	7	18	36	17
Robertson (sandy loam)	1	8	11	40	12	10	9	9
Orange River (clay) ...	0	0	0	$\frac{1}{10}$	$\frac{1}{4}$	3	25	71

* See "Agricultural Soils of Cape Colony," pp. 200–205.

† The eight columns of figures represent successively percentages of gravel, coarse sand, medium sand, fine sand, very fine sand, silt, fine silt, and clay.

These two sets of soils do not resemble each other very closely, but as far as any resemblances in physical composition may be traced from the above figures the Maryland soils may be compared with the Cape soils in the following pairs: the Maryland wheat soil with the Koeberg loam, the Maryland truck soil with the Robertson sandy loam, and the Maryland grass soil with the Orange River clay. These comparisons are made merely to show the lines along which they would be carried out, and not because actual comparison is wholly warranted; and yet the Koeberg soil *is* used particularly for cereal cultivation, while general farming is carried on in connection with the soil representing the Robertson Division.

Whatever *method* is used to illustrate the physical composition of soils and the bearing thereof on the soil's retentive capacity for moisture and the crops for which it is best adapted, is of comparatively small importance. The important thing is that we should, with all possible speed, proceed to ascertain the *facts* which such illustrations, either pictorially or graphically, render intelligible to a larger number—facts on the right interpretation of which so much depends, and into the collection and collation of which, with regard to the United States of America, the Bureau of Soils of the United States Department of Agriculture is throwing itself with an energy absolutely unrestrained. These physical soil investigations we should make the starting point of almost all else that we do to acquaint ourselves more intimately with the nature, capabilities, and requirements of our soils, and we should, as the Americans have done, place it at the foundation of our soil classification and soil mapping. Only when we have done this will we be at all fitted to determine the suitability of our soils for particular species of varieties of crops, and without it we may be in danger of forming altogether erroneous notions concerning the relation and functions of water in connection with various types of soil—notions which may involve us in considerable loss ere the slower advance of practical experience drives home in the course of many decades truths which under the direction of investigation and research we could have become experimentally acquainted with at a much earlier date, and which would have brought in their train, as they have done in the case of the great North American Union, quite a caravan of material advantages not alone to the farmer, but to the country at large. But let us remember that, rapid though our progress may be if we have scientific investigation as leader, the rate of advance will be rapid only in comparison with the tardier movements of the unaided practical farmer. Considered absolutely, the fruits even of unrestricted research are likely to be slow in manifesting themselves, all the more in a country in which scientific exploitation of the kind that I am now dealing with has hitherto been stinted. Obviously, therefore, since we naturally wish to derive profit from the results that we hope for, as soon as we possibly can, we should see to it that towards this goal the earliest possible start is made.

The Laying Down of Permanent Pastures.

By J. A. T. Walters, B.A., Assistant Botanist (Transvaal).

The value of permanent pastures in countries like the Transvaal and Orange Free State, where the winter conditions tell so severely upon cattle, is becoming more and more evident to farmers, and the partial success which has attended the efforts made both by farmers and on our experiment farms has given a decided impetus to this important branch of agriculture. I have frequently heard it said that land laid down to paspalum is worth three times more than the ordinary veld, and paspalum is far from being our only, or even most important, winter pasture grass.

In the following article I have endeavoured to indicate the main principles which should guide the farmer in the laying down of pasture for winter use, and the recommendations are based upon our experience in this line at the station at Skinners Court and on observations made throughout the country in connection with our co-operative experiments with farmers.

Briefly, the kind of pasture that is to be of any use to our farmers is one that will keep green during the whole or greater portion of the winter; that consists of grasses of good nutrient value; and that once laid is permanent or will last for several years at least. Repeated experiments with imported grasses have resulted in the discovery of several that fulfil the above conditions. It is only necessary, therefore, to indicate to the farmer the conditions under which these grasses will flourish to enable him to lay down a pasture for himself.

Choice of locality: *Soil.*—The two natural enemies of winter pastures in this country are frost and drought. Against the first there is no remedy; against the second certain measures can be taken in the preparation of the ground that will materially minimize the risks to the young plants.

A farmer is generally prepared to put down a moderate acreage each year to pasture grasses. There is considerable expense attached to the operation, particularly in the price of seed. With the exception alone of paspalum, the seeds for an acre of pasture will cost from 30s. to 40s. at current rates. A piece of ground should be chosen which can easily be fenced off or protected in some way from cattle. The soil should be of fair depth, say 12 inches at least, although the deeper the soil the better. The question of sub-soil is not important as it is in the case of a crop like lucerne. New lands or old lands may be used, but if the crop is very weedy it would naturally be advisable to grow a cleaning crop on it, such as teff grass, the previous year.

Preparation.—As the object of the farmer is to get the land into as fine a state of cultivation as possible, it will be almost unnecessary to indicate to him the means to be employed to that end. Unlike his

other crops, sowing will not take place until January or February, so that he has ample time for thorough preparation and to get his land into better condition than for his other crops. I will endeavour, then, to indicate briefly the steps to be taken.

First ploughing.—This should be done preferably the previous autumn or winter, or, if this is impossible, early in spring with the first rains.

The disc harrow should next be applied to this land to break it up into as fine a tilth as possible, and if necessary (as will probably be the case) the roller to further break it up and consolidate the soil.

Second ploughing.—This may not always be necessary, although it is advisable. The weeds will have grown apace with the rains, and long before they have seeded the ground should be cross-ploughed in order to turn them all under. If the first ploughing has been done well the disc-harrow alone may suffice; the farmer will be the best judge of that. The point is that the weeds must be buried, and the land got into as fine a state of tilth as possible. Once more the roller should be brought into use, and the soil should be compacted as before. This will not interfere with the fine tilth on the surface, which is intended to prevent the summer moisture from escaping. The roller, however, will never be used when the soil is not dry enough to bear it—this is a point of considerable importance.

This second ploughing or discing will be followed by a light harrowing after every heavy rain, and the farmer will find a decreasing tendency on the part of the weeds to appear. By the middle of January his lands will be ready for sowing and will then be in a state of fine tilth, and will contain a large amount of moisture.

These operations may seem long and tedious. What is necessary is that the farmer should understand the reason for these operations and the results he endeavours to obtain. If then he considers that any of them can be omitted or altered, he can use his own judgment in the matter. Under ordinary conditions, however, if the best results are to be obtained, none of the above operations should be omitted, as they are essential to the production of a well-cultivated, clean, and compacted seed-bed containing a large proportion of moisture from the rains that have already fallen.

Choice of pasture.—In Europe and America it is usual to lay down pastures for two, three, or four years as part of a rotation scheme. In this country, however, farmers are not likely to adopt this practice for many years to come, and it will only be necessary to consider the permanent pastures at his disposal. These will either be *pure*, i.e. consisting of one kind of grass or other plant only, or *mixed*, i.e. consisting of several kinds of grasses or other pasture plants.

Pure pastures.—For this kind of pasture in South Africa, three plants stand pre-eminent: Paspalum grass, tall fescue grass, and lucerne. All three stand drought particularly well, but paspalum will not stand a severe frost. Paspalum is known to thrive in almost any kind of soil, from thin sandy to heavy marshy soil. Indeed it will grow excellently even under water, and the only enemy it is known to succumb to is the frost. It has a high feeding value, and is particularly useful as grazing for milch cows and brood mares. A drawback frequently complained of is the alleged poor germination of its seeds. But if the seeds are obtained from a reliable dealer a high percentage is certain to germinate, although they sometimes

take long to do it, as they require more moisture than the ordinary seeds. Paspalum is the only seed which can with safety be sown in November or December, as once it germinates it is able to hold its own against any of our native weeds or grasses, and spreads rapidly once it attains maturity. A point to be remembered about the seeds is that they are water-borne; paspalum will, therefore, tend to spread down a hill or a stream.

Paspalum should never be used in mixtures. Its strong spreading habit tends to kill out all other plants in the same plot.

Tall fescue (*Festuca arundinacea*).—This is undoubtedly the best all-round grass for pasture purposes in this country. In addition to withstanding drought, it can also resist the heaviest frosts we have in this country, and, if once established, will keep green right through the winter of the high veld. Although it flourishes in a wide range of soils, tall fescue does best in good, rich, loamy soils, but does exceedingly well also in heavy, clayey soils. It will do better on moist than on dry lands, and on heavy lands than on light ones. On fairly moist, rich, loamy lands it flourishes and spreads wonderfully, providing a good hay crop in summer and excellent green pasture in winter. Although admirable as a pure pasture, it can be used in a mixture, as it does not tend to kill out any other plants sown with it. A dry-land plot of this grass at the Experiment Station, Pretoria, on black, clayey soil was cut about the end of June, and in three weeks' time a growth of three inches had been made, although fourteen degrees of frost had been experienced, and by 15th October the grass was from 10 to 12 inches high, and was flowering. To ascertain if there was an unusual amount of moisture in the soil a hole was dug near the plot, 8 ft. deep. The soil was found to be very dry to the depth of one foot, when clay was struck. This clay was only just as moist as one would expect it through being covered with one foot of earth. Of course, it is not likely that the grass would do equally well all over the high veld, but its record from all parts proves it to be a great success wherever it has been established.

Mixed pastures.—It is much more usual to lay down mixed pastures than pure pastures. If this is done, cattle will have a greater choice of grazing, which is a great advantage. There is also another reason why mixed pastures are more useful. Different grasses have different habits of growth. Some grow in large tufts, such as tall fescue or cocksfoot, others again do not spread in this way, such as rye grass and tall oat grass. Some grow to a considerable height, others remain low or creep along the ground. If grasses that grow in tufts are mixed with others of a different habit, the ground will be better covered. In the pasture mixtures that have been tried for the Transvaal and Orange Free State tall fescue has always played a prominent part on acount of its marked superiority. It is the foundation of the mixture, and the additions consist of the following grasses and pasture plants, which are included for the reasons named:—

Cocksfoot (*Dactylis glomerata*).—A useful, hardy grass, doing well on some of the coldest portions of the high veld, and also in some parts of the Potchefstroom District. It is subject to rust and suffers from drought.

Rye grass (*Lolium perenne*).—One of the best liked and most nutritious of pasture grasses, but very liable to be destroyed by rust in the first few years.

Awnless brome (Bromus inermis).—A valuable addition when once established. At the trials made at Skinners Court, stock preferred this to most of the other new grasses, and kept it grazed down persistently.

Rescue grass (Bromus unioloides).—This grass is well known to farmers, and does particularly well under the shade of the trees. It is a biennial, but seeds so abundantly that it never disappears from a pasture. Stock are very fond of it.

Phalaris bulbosa.—In many ways the most valuable of our winter pasture grasses, as it makes faster growth and is less coarse than any other of the grasses mentioned. It requires good, loamy soil, and preferably a damp situation, although in Australia this grass owes its reputation to its drought-resisting qualities. Owing to the high price of seed, some farmers grow this grass in beds, and transplant it into rows some distance apart, when it soon fills the intervening spaces. There appears to be some difficulty in getting the right seed, and many farmers complain that the crop with them has turned out to be a poor annual. There seems to be no doubt of the high value of this grass if the right seed can be obtained. *Phalaris bulbosa* has not proved satisfactory under all conditions.

Tall oat grass (Aarhenatherum elatius).—A grass that has given excellent results in the Ermelo District and elsewhere. It is worth inclusion in a mixed pasture, but cannot be counted upon to last more than three or four years unless allowed to seed.

OTHER PASTURE PLANTS.

Clovers (Trifolium spp.).—Every pasture should contain a certain amount of clover, particularly as most of the clovers, being leguminous plants, are rich in nitrogen, and thus help materially in the formation of a well-balanced food. *Cow-grass clover* grows to a good height, and forms bushy plants, lasting for about two years. *Black medick, or yellow trefoil,* does well on calcareous soils, and lasts two or three years. Any of these are worth inclusion in a mixed pasture. *White clover* is a lower growing plant than the others, and has a spreading habit. It is permanent, and should not be omitted from a pasture mixture.

Sheep's Burnet (Sanguisorba minor).—A very useful addition to any pasture, particularly if meant for sheep. This plant has been known to thrive on poor, sandy soil, and although uneven in a stand it not unfrequently forms a large bush of perfectly green fodder in a field of mixed pasture.

Sheep's Parsley (Petroselinum sativum).—In great favour on account of its tonic properties for ewes after lambing, and well worth including in small quantities if the pasture is meant for sheep.

Sainfoin (Onobrychis sativa).—A deep-rooting, leguminous plant, doing well in some parts of the Transvaal and Free State, where the soil contains plenty of lime.

Sulla (Hedysarum coronarium).—Some individual specimens of this plant grew to a height of 2 feet 6 inches at Skinners Court, Pretoria, this last winter on rather poor, dry soil. Cattle are not very partial to it, although in Europe it is considered good feeding.

Lucerne (Medicago sativa).—No pastures should be without a little of this valuable plant, although it is not likely to last more than

a few years if there is not the requisite depth of soil or a suitable subsoil.

Lamb's tongue plantain (*Plantago lanceolata*).—Although of low-feeding value, this is a hardy plant, and will keep green in poor lands during the hardest winters.

Having thus enumerated the various ingredients which can be used in the formation of a suitable mixed pasture for the Transvaal, the farmer can make a selection of these for himself. He has only to remember (1) that tall fescue should form from 30 to 60 per cent. of the total; (2) that the constituents of the pasture should be regulated so that the surface should be well covered, i.e. they should consist of a mixture of tufty grasses, creeping grasses, and tall grasses; (3) that some clovers or other leguminous plants should be included; (4) if meant for sheep a small quantity of burnet and sheep's parsley should be included.

I would therefore suggest a general mixture for the high veld which can be modified as experience or other circumstances suggest, as follows:—

			£	s.	d.
Tall fescue	20 lb.	cost	0	15	0
Burnet	3 „	„	0	2	3
Phalaris bulbosa	1 „	„	0	5	0
Rye grass (Italian & perennial)	2 „	„	0	1	6
Cocksfoot	3 „	„	0	2	0
Black medick, White clover, Lucerne	6 „	„	0	6	0
Sheep's parsley	1 „	„	0	0	9
Rescue grass, Tall oat grass, Awnless brome	4 „	„	0	3	0
	40 lb.	cost	£1	15	6

or this may be simplified as follows:—

			£	s.	d.
Tall fescue	25 lb.	cost	0	18	9
Burnet	5 „	„	0	3	9
White clover..	4 „	„	0	3	0
Lucerne	1 „	„	0	1	3
Any other grass	5 „	„	0	5	0
	40 lb.	cost	£1	11	9

or further still as:—

			£	s.	d.
Tall fescue	35 lb.	cost	1	6	3
White clover or burnet ..	5 „	„	0	3	9
	40 lb.	cost	£1	10	0

Sowing and subsequent treatment.—It has been remarked that the soil, although ploughed as deep as is practicable, must subsequently be compacted by rolling. The ground will then be ready to receive the seeds. If the soil is very loose, poor germination is the inevitable result. If rolling cannot be practised before sowing it must be done after sowing

and again when the plants are a few inches high. This will prevent the enormous evaporation which will take place say if a period of drought follows after seeding. The lack of rolling is, I think, the cause of more failures than any other. It stands to reason that the delicate roots of any young plants have no chance in loose surface soil if even a moderate drought occurs.

Weeds.—Very few weeds germinate after January, so that this matter will not need much attention, and the following season the grasses will have had such a start over the weeds that they are not likely to suffer much.

Manuring.—Very few farmers will be prepared to manure the ground for a pasture mixture, and in the majority of cases this will not be necessary. The farmer will realize that his poorest lands are not good enough for such a valuable thing as permanent pasture. If, however, for any particular reason, there is a desire to manure, I will briefly indicate what can be done.

(1) On new lands.—If the soil is alluvial no manure is necessary. If not, 200 lb. of superphosphate (cost 11s.) will be sufficient.

(2) On old lands that have been cropped to maize for many years, 200 lb. of Cape Government guano, or 200 lb. superphosphate. On old lands after roots, no manure will be necessary. If the previous year's crop is manured with basic slag, no manures will be necessary for the grasses. This is perhaps the most profitable course to adopt. Another course is to grow a leguminous green manuring crop the previous year on the land meant for grasses, and plough the whole crop in.

The grasses will have grown to a considerable height by the end of May. They should not be cropped too closely the first winter, and particular care should be employed if sheep are to be turned on, to prevent the young plants from being destroyed.

In an article on the "Making of Pastures" which appeared in Volume V of the *Transvaal Agricultural Journal* from the pen of Mr. Bayliss, the writer suggests that the introduction of certain foreign grasses will solve the problem of summer and winter grazing in this country. This is the line along which the Division of Botany has been experimenting for years, and the practical results of its labours are indicated above. But the subject is far from being exhausted, and it is only as its importance will be grasped by the farmers and co-operation with them secured that real progress in the mastery of this subject will be obtained.

Notes on Some Wheat-breeding Experiments at the Botanical Experiment Station, Pretoria.

By J. A. T. Walters, B.A., Assistant Botanist (Transvaal).

Improvement of the Transvaal wheats was started by the Division of Botany about six years ago, and has been systematically continued ever since. The object in view was twofold—

(1) to secure pure strains of wheat, particularly of the locally grown breeds, which were evidently composite to a great extent; and

(2) to improve the existing breeds by selection of the best strains.

The method employed for purifying the various breeds is that already used with such success by European breeders, and consists of the selection out of each breed of a few ears which are undoubtedly true to type. These are sown by themselves, and the resulting grain is saved. This is again sown in bigger plots, and in a few generations sufficient seed is obtained for distribution among farmers.

It is evident from the results obtained in Europe that if improvement is to be obtained the breed must be purified of any inferior admixture. That was the first step. Then came improvement by breeding from the best ears selected in the fields, these ears being superior to their companions under equal conditions of space and cultivation. It is known that these ears usually breed true to type, and if the grain is sown by itself an improved strain may be obtained which in a few generations will be available for distribution.

The process of improvement does not stop here, however. The great Swedish wheat breeder, Dr. Nilsson, when working on cereals at the Experiment Station at Svalöv discovered that what we call a breed or a "variety" of wheat is in reality made up of an incredible number of distinct types resembling each other sufficiently to be distinguished in the bulk from other breeds, but nevertheless having important points of difference which enabled him to separate each into a large number of types. These types, when sown apart, *always breed true to type*. Hence he conceived the idea that if progress in breeding was to be certain and rapid it must start from *a single ear*, and that subsequent selection was unnecessary. What was of the greatest importance was the first selection and the basis on which that selection was made. This is the method which was adopted for the improvement of wheats at the Experiment Station at Skinners Court, and which has been continued by the Division of Botany ever since. In a plot of any breed the best ears are carefully selected and when reduced by further selection to three or four these are sown in rows—

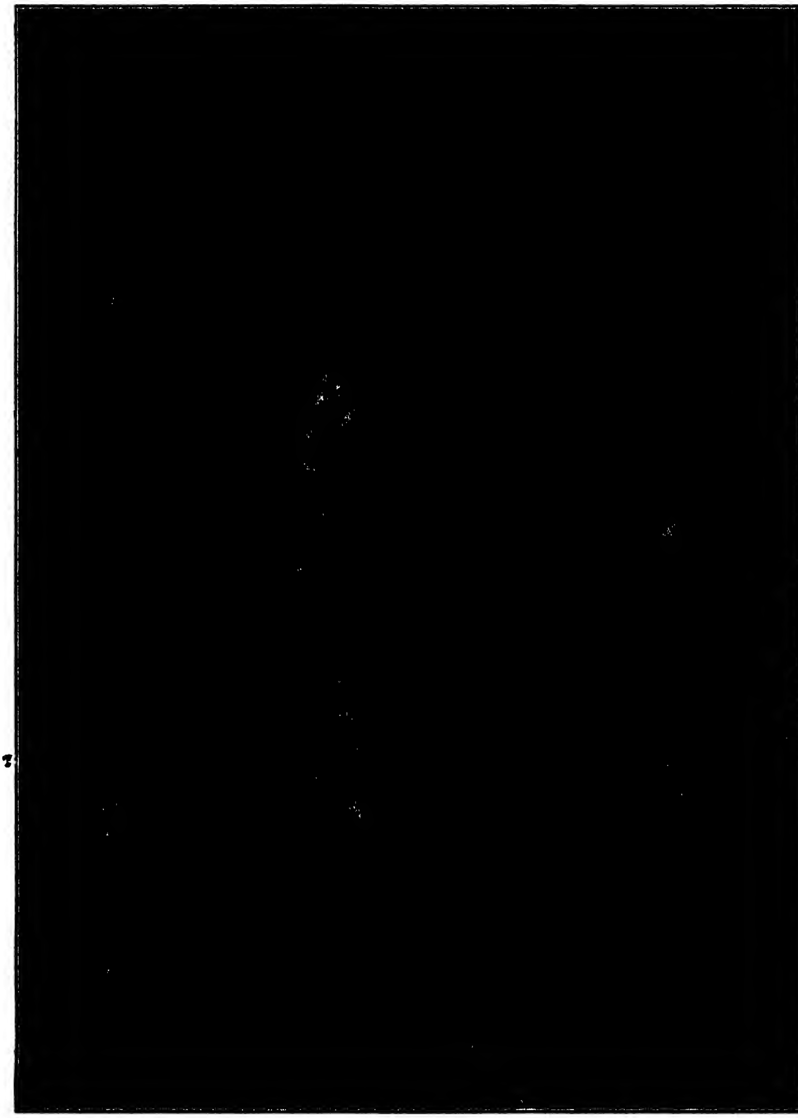
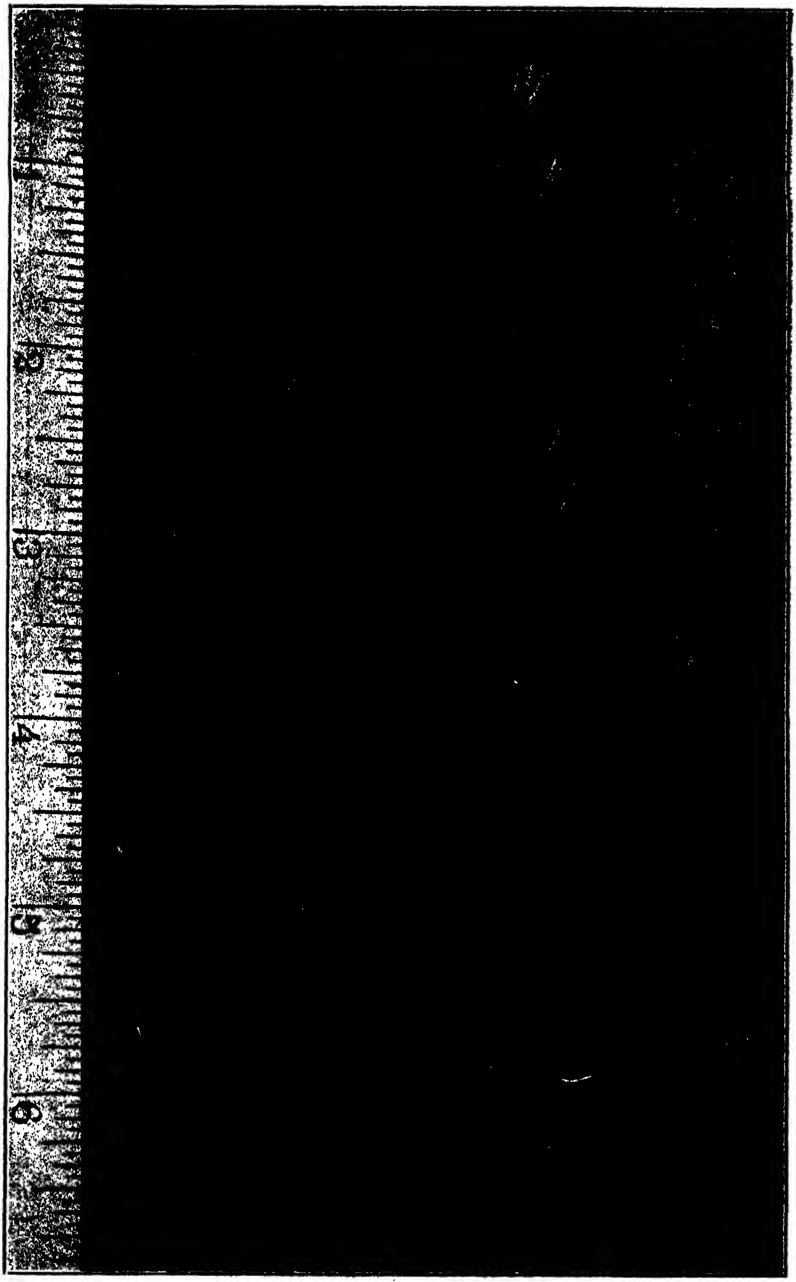


Plate 1. Improved Ears of Medeah, Zwartbaard, and White Egyptian.

Plate 2. Improved and Original Size of Ear of Unknown Variety.

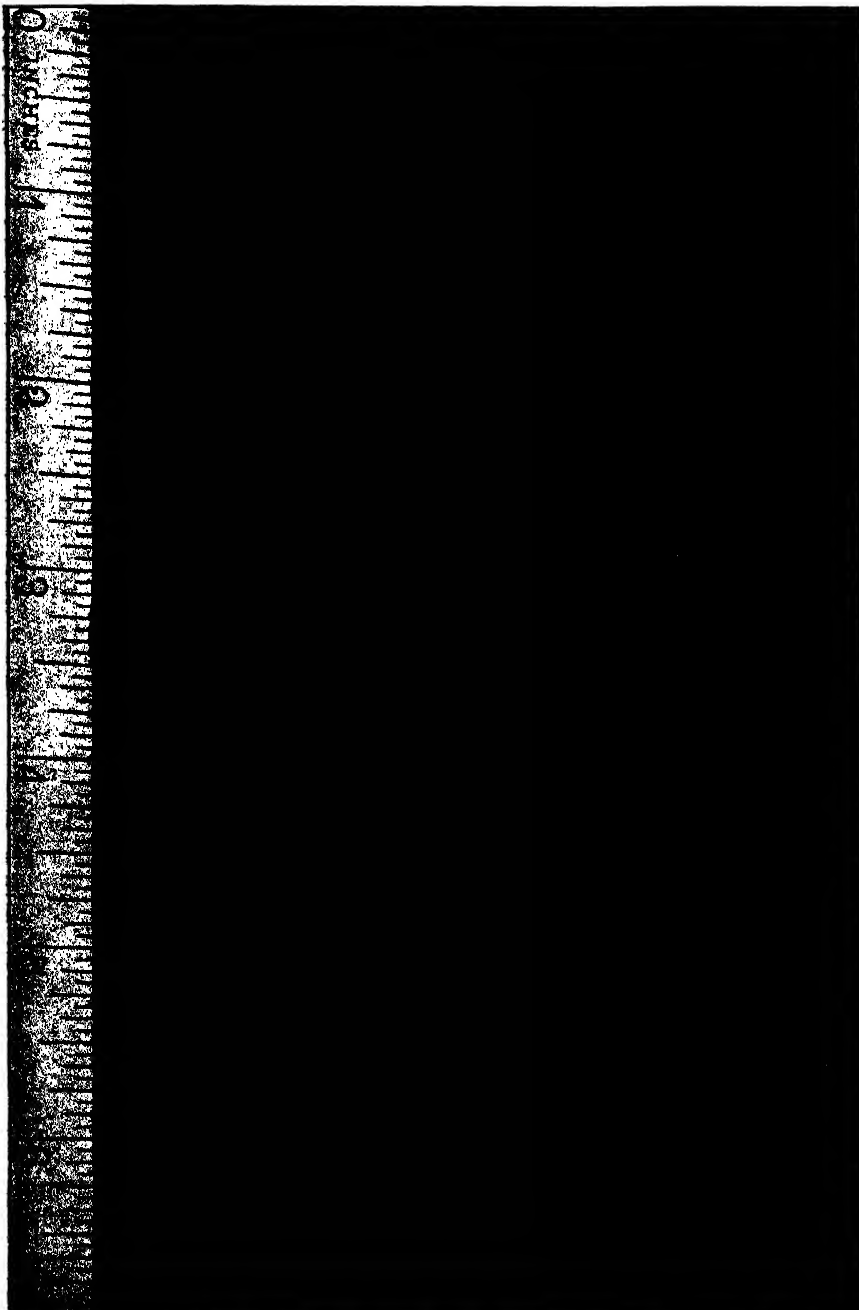
Wheat-breeding Experiments (Transvaal).



Rooi Wol. Wit Wol.

Plate 3. Improved forms of Rooi Wol Koren and Wit Wol Koren.

Wheat-breeding Experiments (Transvaal).



Polish. Persian.

Plate 4. Polish and Persian Wheats.

one ear to a row. This process is designated "row cultures". The seeds from the best row form the starting point for the new strain. That improvement at Pretoria has not been more rapid is due to the many drawbacks which had to be contended with, principally the ravages of rust in certain years, resulting occasionally in the complete destruction of one or two year's work. In spite of these drawbacks a good deal of selected seed wheat has been distributed from the Experiment Station at Skinners Court.

The breed known as "Wol Koren" was found to consist of two distinct strains, which have been separated and are now known as "Wit Wol Koren" and "Rooi Wol Koren", the ears in each case being white and red respectively. Plate No. 3 shows improved ears of Wit Wol Koren and Rooi Wol Koren as a result of several years selection.

In the same way "Klein Koren" was found to consist of a red and a white strain quite distinct from each other in colour, although alike in other respects, and a number of other slightly modified strains of almost similar wheat. These impurities were obvious in any samples of Wol and Klein Koren placed on the shows or on the market by farmers, and damaged the samples from the buyers' point of view.

Nor were these operations confined to Wol and Klein Koren. The breeds selected for improvement in this way included Medeah, Zwartbaard, Holstrooi, Red and White Egyptian, Darling, Beloturka, Celliers, New Era, and the local breed known as "Wit Erf". The accompanying illustrations will help to indicate the nature of the work done, and possibilities which lie in this direction.

Plate 1 shows ears of improved strains of Medeah, Zwartbaard, and White Egyptian after three years' selection.

Plate 2.—Ear of Skinners Court taken with an ear showing the average size of the normal strain from which it was isolated.

Plate 3.—Improved strains of Wit Wol and Rooi Wol Koren.

Plate 4.—Polish and Persian Wheats.

Plate 5.—Gluyas Early, Federation, and Australian Wheat—three imported wheats that promise well in this country.

Plate 6.—Holstrooi and Klein Koren.

Plate 7.—Progeny of single grain of Darling Wheat (row cultures).

Plate 8.—Progeny of single grain of Skinners Court Wheat (row cultures).

Plate 9.—Progeny of single grain of Holstrooi (row cultures).

Plate 10.—Progeny of one ear of Wit Wol Koren (row culture).

The principle involved may be briefly stated as follows:—

So-called breeds of "varieties" of cultural crops usually consist of a larger or smaller number of separate strains only distinguishable to a well-trained eye, but varying greatly in hardiness and productiveness. Much improvement in yield, etc., can be effected by the isolation, comparative study, and subsequent propagation of the best of these strains. This work must not be confused with the improvement of a strain by cross-breeding, nor with the attempted improvement by selection of "fluctuating variations", which was at one time practised by some of the earlier "plant-breeders". The essence of the method here outlined is the isolation and propagation of the best existing strains of any breed which may be found suitable to local conditions.

In Europe this method has produced most of the best breeds which have been placed on the market during the last twenty years, and there is no reason why the wheats—local and imported—which are best adapted to this country should not be improved in the same way. The advantage to the farmer is obvious. It has been done extensively with maize; why not with other cereals?

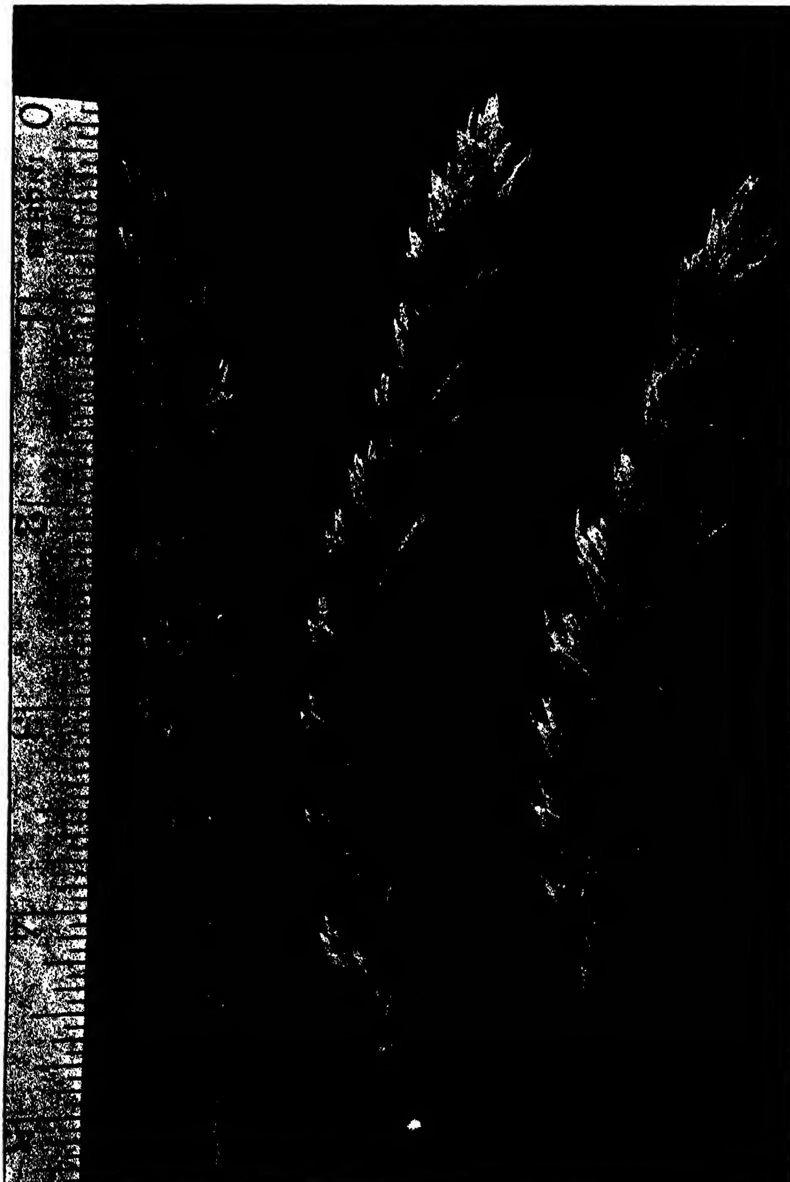


Plate 5. Gluyas Early, Federation, and Australia

Plate 6. (34) Holstrooi, 10–14; (30) Rooi Klein Koren, 10–10; (31) Rooi Klein Koren, 10–11.

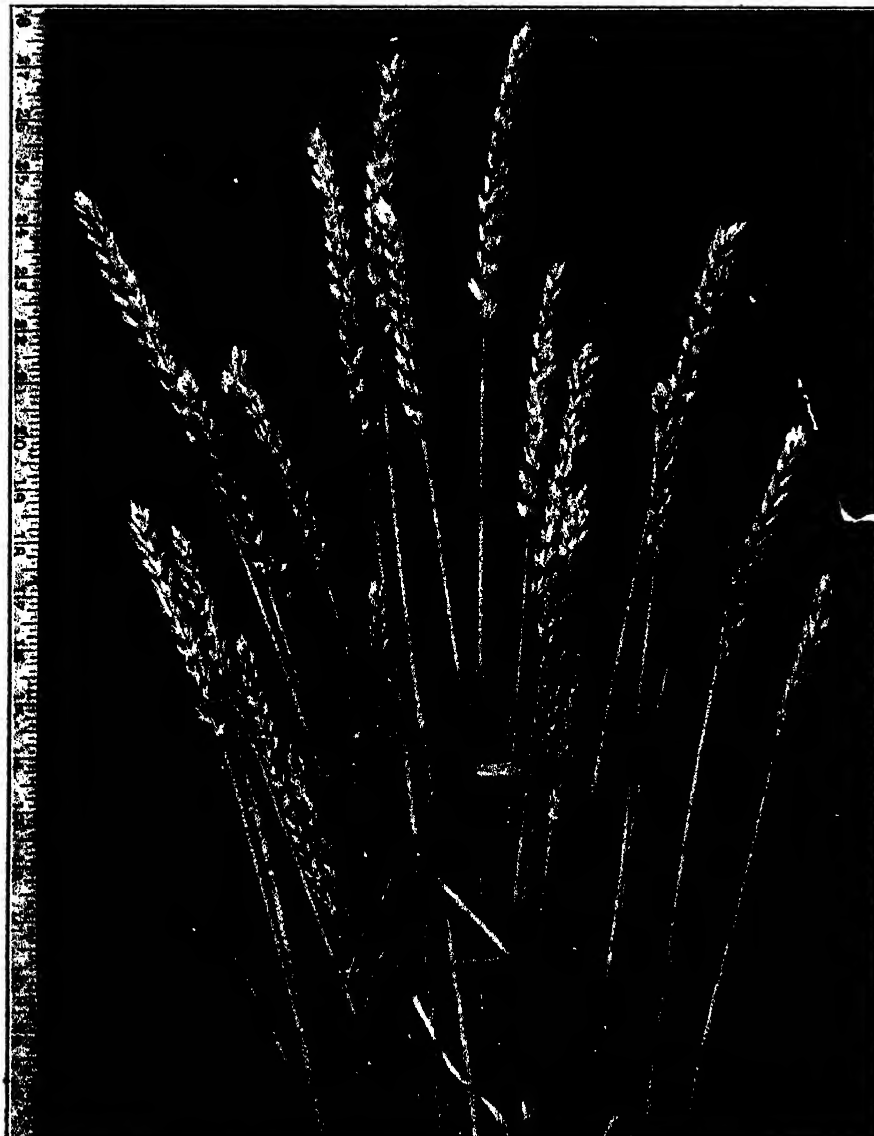


Plate 7. Darling Wheat, Row Culture, 1911; progeny of a single grain.

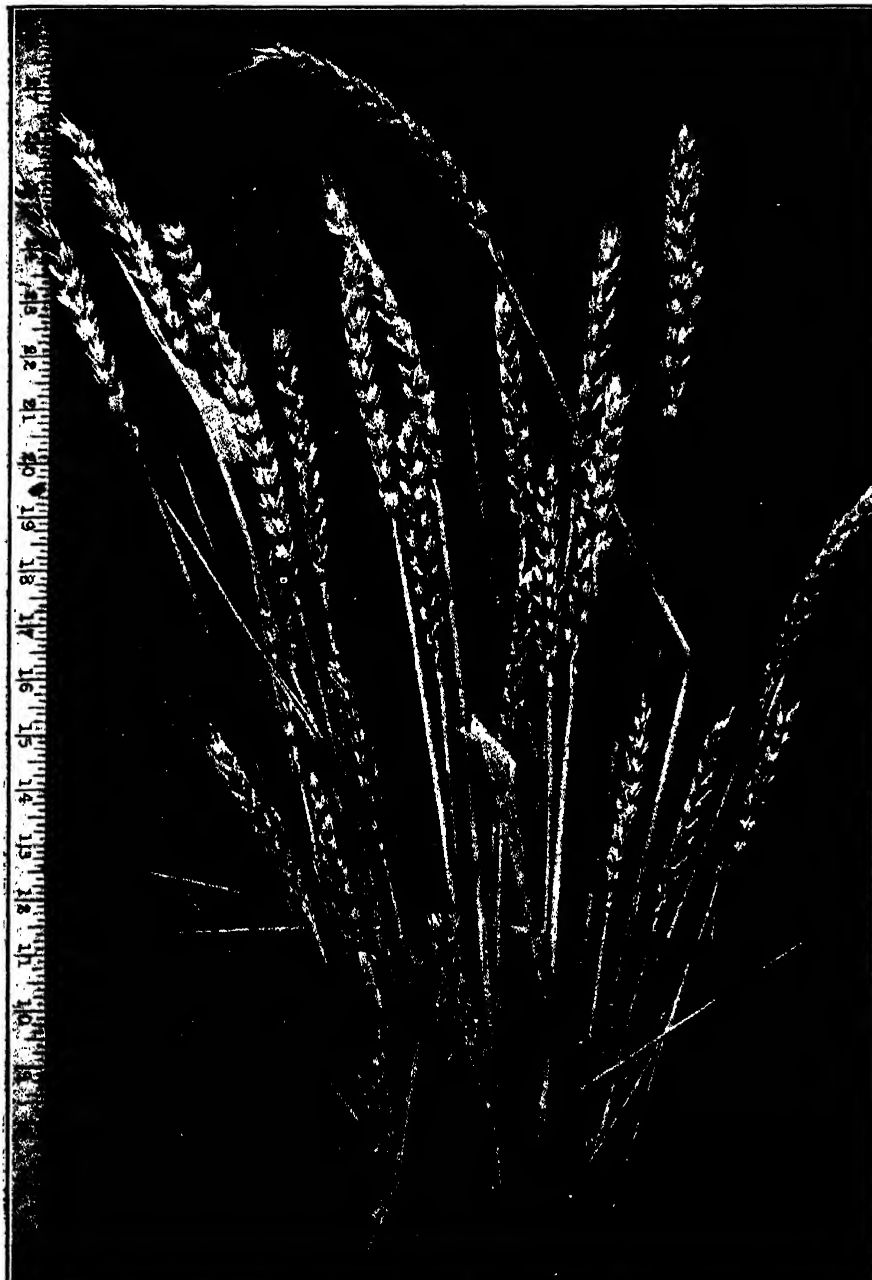


Plate 8. **Unknown, Row Culture, 1911; progeny of single grain.**

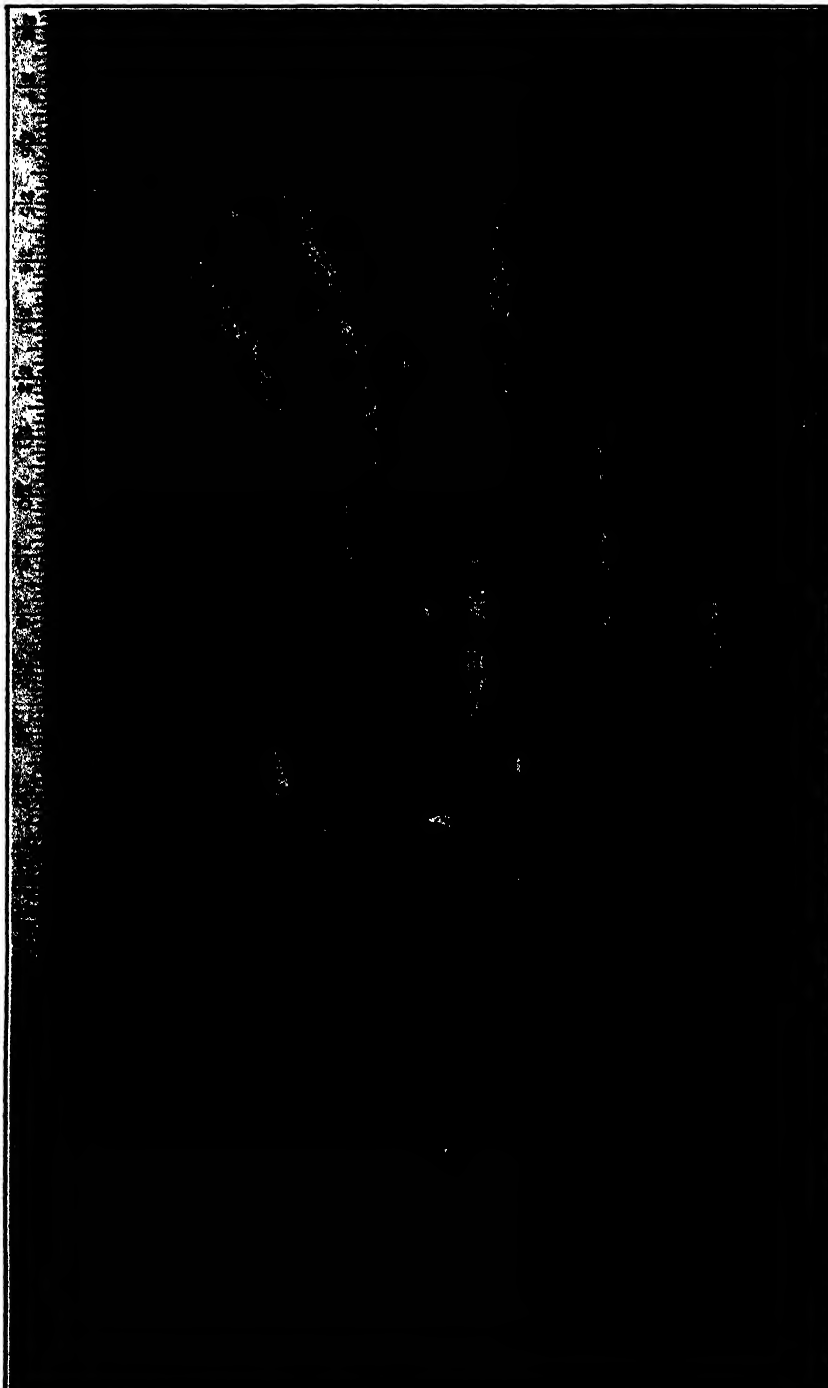


Plate 9. Holstrooi, Row Culture, 1911; progeny of single grain.

Wheat-breeding Experiments (Transvaal).

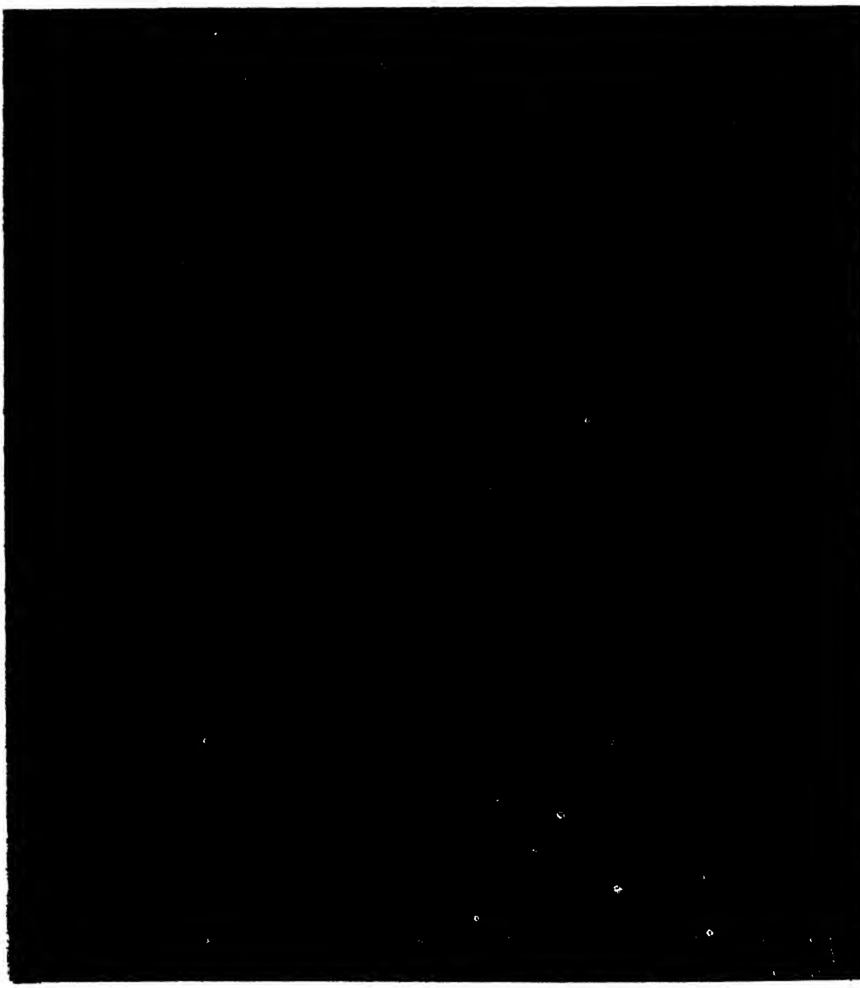


Plate 10. Progeny of One Ear of Wit Wol Koren, Row Cultures.

South African Agricultural Union.

SEVENTH ANNUAL CONGRESS.

The seventh annual Congress of the South African Agricultural Union opened in the Town Hall, Bloemfontein, on Monday, the 13th November. Proceedings began at 9 o'clock, when the executive committee met under the presidency of Mr. G. A. Kolbe, the president. Members of the committee were present from the Transvaal, Natal, Free State, Rhodesia, and Portuguese Territory. The business was of a formal nature. Recommendations were drafted for the open meeting of delegates as to the hours at which the Congress should sit. Those decided upon were from 9 to 11 a.m.; from 11.15 to 12.45 p.m.; from 4.15 to 6 p.m.; and from 8 p.m. onwards; if the work proceeded satisfactorily, night sittings to be done away with.

At 10.20 the proceedings were commenced by the secretary, Mr. C. McG. Johnston, calling the roll, the following answering to their names:—

Rhodesia: Messrs. De Kock, H. G. Blackhouse, T. Savory, W. Laing, F. Eyles, W. J. C. Shone, Cripps, and Dr. Eric Nobbs (Director of Agriculture).

Transvaal: Messrs. F. T. Nicholson, Jan Meyer, W. H. Poulteney, Kemp, Hans Meyer, Pott, and A. G. Robertson.

Natal: Rev. J. Scott and Messrs. W. J. S. Newmarch, P. R. Vermaak, W. J. Slatter, W. Comrie, G. C. Mackenzie, Tandy, and C. Mitchell.

Cape Province: Messrs. O. E. G. Evans, C. W. C. Kohler, W. Rubidge, R. H. Struben, P. R. Malleson, C. H. Mackey, and J. Woodin (Acting Secretary, Cape Agricultural Union).

Orange Free State: Messrs. G. A. Kolbe (President of the S.A.A.U.), J. G. Fraser, H. M. Steyn, J. Marais, C. G. Radloff, T. van Reenen, A. J. Griesel, S. G. Vilonel, J. P. Steyl, and Mr. C. McG. Johnston (Secretary to the Congress).

In addition there were also present the Hon. the Administrator (Dr. Ramsbottom), who opened the Congress; Mr. F. B. Smith (Secretary of Agriculture), Mr. O. E. Challis (Inspector of Dairies for the Union), Mr. W. Ehrlich (Mayor of Bloemfontein), and Mr. E. J. Macmillan (Acting Under-Secretary of Agriculture, Orange Free State).

The opening ceremonies having been performed, the replies to resolutions passed at the last Congress were considered in detail.

The Agenda.

The following motions entered on the agenda were then considered, the proceedings lasting until Wednesday afternoon:—

Farm Foods, Fertilizers, and Seeds.—Rev. J. Scott, on behalf of the Natal Agricultural Union, moved: "That in the opinion of

this Union the time has arrived when a general Act should be passed embracing the whole of South Africa, securing farmers against the vending of spurious or diseased seeds and plants, or deficient fertilizers, or farm foods, and attaching full responsibility to the vendors on any proved failure of quality or description."—Seconded by Mr. P. R. Malleson (Cape) and carried.

Noxious Weeds.—Mr. Oscar Evans moved, on behalf of the Cape Agricultural Union: "That Congress brings to the notice of the Union Government the necessity for the operation of uniform legislation in the Union which will tend to the eradication of noxious weeds, specially mentioning burweed and jointed cactus."

Mr. A. G. Robertson (Transvaal) proposed the following: "That Congress bring to the notice of the Union Government the necessity for the operation of uniform legislation in the Union which will tend to the eradication of noxious weeds, and that the Government be requested to render the necessary assistance for the eradication of such weeds when necessary."

Mr. Nicholson (Transvaal) proposed the following resolution as an amendment to the two resolutions on the agenda: "That the Government be requested to frame and pass a stringent noxious weeds law with a view to the total eradication of such plants, and that in such law all plants shall be included which can be justly regarded as of a noxious nature, and that such law shall be made to apply to all Crown lands, native locations, railways, roads, outspans, and areas within the control of municipalities and private properties, with a view to the eradication of such weeds."

This was seconded by Mr. Struben (Cape).

Mr. Nicholson's amendment was adopted.

Agricultural Laws.—Mr. Nicholson, on behalf of the Transvaal Union, moved: "To request the Minister of Agriculture to lay a draft of each law affecting the agricultural industry before the various agricultural bodies in the Provinces concerned for their consideration and suggestions thereon."—Agreed to.

Transfer Dues.—Mr. Michau, on behalf of the Cape, moved: That Congress is of opinion that a system of uniform 'Transfer Dues' should operate throughout the Union."

Mr. Eyles (Rhodesia) suggested the addition of the words to the original resolution: "And that the rate shall not exceed the minimum transfer dues now obtained in the Union."—Agreed to as amended.

Natives and Liquor.—With the consent of Congress, the following motion by the Cape Agricultural Union was withdrawn: "That Congress desires to bring to the notice of the Union Government the desirability of the introduction in the whole Union of legislation covering the prohibition of the sale of alcoholic beverages to natives in the Union."

Creamery Inspection.—Mr. J. G. Fraser (Orange Free State) moved: "That this meeting urges that legislation be enacted providing for the Government inspection of creameries, making it the duty of dairy inspectors to prosecute in cases where irregularities occur in connection with the management, testing, or weighing of cream supplies purchased."

Mr. J. van Reenen (Orange Free State) seconded and carried.

Licences and Land for Asiatics.—Mr. Mitchell, on behalf of the Natal Agricultural Union, moved: "That this Conference is of

opinion that it is not in the interests of South African progress that Asiatics should hold trading licences and possess land; therefore it urges upon the Government the desirability of stopping the issue to Asiatics of any new licences or transfers and of prohibiting the transfer to them of land in freehold."—Carried.

Fencing Law.—Mr. S. G. Vilonel (Orange Free State) moved: "That a suitable fencing law is required for the Union."

After discussion, Mr. R. H. Struben (Cape) moved that the matter be referred to a committee of two delegates from each Province, who should meet and draft a Bill for the benefit of the Government and report to the Congress on Wednesday morning.—Seconded by Mr. Radloff and carried.

The Labour Question.—This was debated at great length on the several propositions brought forward.

Mr. Struben (Cape) proposed the following resolution: "That, in the opinion of this meeting of the South African Agricultural Union, immediate steps should be taken by Government to assist in adjusting the economic condition of the labour market within the Union, whereby the agricultural industry is at present greatly handicapped, and recommend action be taken on the following lines:—

"(1) Prohibition of labour recruiting in recognized farming areas.

"(2) The prohibition of the collection of unemployed natives in localities other than native reserves or locations.

"(3) The discouragement in every possible legal manner of the sale or lease in any form of land by Europeans to natives either as individuals or as communities.

"(4) The dispersal of semi-idle natives who collect in municipal locations.

"(5) The stringent enforcement of existing pass laws and the increase of the efficiency of and the penalties imposed under the Master and Servants Act (Cape). Passes only to be granted by or with written permission of the owner of the land upon which the native resides.

"(6) The granting of rebate of a portion of the hut tax to all natives who have worked for not less than six months for Europeans, and an increase of the tax on all who have not so laboured.

"(7) The employment of white labour wherever possible by Government, corporations, and individuals.

"(8) The imposition of a heavy poll tax on all native boys and men used in domestic service.

"(9) Laws shall be enacted and enforced in all native locations and mission stations for the preservation of the health conditions of the inhabitants thereof."

Mr. Tandy seconded.

Mr. Mitchell (Natal) moved the following rider to the proposition by Mr. Struben: "Beyond these, as in the opinion of this Union, when all has been done that can be done, there is not sufficient available labour in the country for the needs of the country, it would urge upon the Government the need for supplementing the supply by the introduction of outside indentured labour under the necessary regulations and restrictions."

On the proposition being put to the meeting it was carried unanimously. The rider was negatived.

Dairy Assistants.—Mr. Marais (Orange Free State) moved: "That, in the opinion of this Congress, it is imperative that a number of competent dairy assistants should be at once appointed so that instructions and advice on dairy matters can be given to farmers on their farms."—Carried.

Agricultural Lectures.—Mr. Mackay (Cape) moved: "That Congress desires to express the opinion that the system of the delivery of lectures on agricultural subjects, which are demonstrated by the display of educational materials, and also the lectures on all classes of live stock at agricultural shows should be extended as far as possible by the Union Department of Agriculture."—Mr. Malleson seconded and this was carried.

San José or Pernicious Scale.—Mr. Nicholson (Transvaal) proposed: "That this Union, while approving of the efforts of the Government to eradicate pernicious scale, strongly urges that adequate compensation be paid for all trees destroyed in connection with this movement, and recommends that such compensation be based on the deterioration of property."

Mr. Malleson (Cape) moved to preface the Transvaal resolution by the following:—

"(1) That the Government be urged to strengthen the staff of the Entomological Division of the Agricultural Department, which at the present moment is insufficiently supplied with properly-qualified entomologists.

"(2) That the Government be urged to spare no expense in stamping out the San José scale."

Mr. Nicholson (Transvaal) accepted the amendments.

Mr. Lounsbury (Chief Entomologist) having explained the case at some length, after an animated debate the following resolution was carried unanimously: "That this Congress would urge Government to make every effort to eradicate San José scale, and urges that just compensation be paid for all trees destroyed."

Mr. Malleson said he thought Congress should unanimously adopt his motion that the Entomolegical Department be increased and strengthened.

Mr. Kohler seconded and it was carried unanimously.

Agricultural Information.—Rev. Jas. Scott (Natal) moved: "That in the opinion of this Union the Government should make complete provisions for the prompt publication of scientific discoveries in connection with stock and crops, and also of the progress of experiments relating to this subject."—Withdrawn in favour of the next resolution.

Mr. Newmarch (Natal) moved: "That, in the opinion of this Conference, arrangements should be made by the Union Government for the immediate publication of the location of outbreaks of contagious and epidemic disease among stock and for the regular publication of the progress of such outbreaks; further, that provision should also be made for the early publication of the results of scientific investigations in connection with stock and plant life, and also of the progress of experiments relating to these subjects and that the practical application of such investigations should be published from time to time for preference in the form of handbooks

dealing with the farming practices of the various forms of agricultural industry in South Africa."—Agreed to.

Agricultural Teaching.—Mr. Nicholson (Transvaal) proposed: "That, in view of the large number of youths who are at present failing to receive a useful education, it is desirable that institutions be established where the rudimentary principles of agriculture could be taught in addition to the elements of ordinary education, so as to admit of such youths being beneficially employed upon farms in the Transvaal."

Mr. Struben (Cape) moved the following amendment: "That, in view of the large number of youths who are at present failing to receive a useful agricultural education, it is desirable that the rudimentary principles of agriculture be taught in addition to the elements of ordinary education in institutions suitable for such teaching."—Accepted and agreed to.

Mr. Nicholson (Transvaal) moved: "That it is highly desirable, in view of the continuous migration of the youthful portions of the rural populations to the towns, that the system of education, in rural areas, should be so amended as to aid in checking this undesirable tendency."—Mr. Oscar Evans (Cape) seconded and agreed to.

Railway Matters.—During the discussion on the following subjects, Mr. Corry, of the Railway Department, was in attendance and took notes.

Mr. Poulteney (Transvaal) moved: "That the railway authorities be requested to extend the time allowed for loading and unloading of trucks in respect of consignments made by and to farmers, as the present period is not considered sufficient to allow farmers residing at some distance from the station to complete loading or unloading within the present maximum time limit."—Carried.

Mr. Kemp (Transvaal) proposed: "That this Union desires to bring to the notice of the Hon. the Minister of Railways and Harbours the great disadvantage under which certain districts labour owing to the fact that agricultural machinery and other agricultural necessaries have to be forwarded via certain junctions from whence they are sent forward to the place to which they are consigned, thus increasing the mileage to a length very much greater than would be covered if an approximately straight line were in operation from the ports to such places, and consequently putting farmers to a very considerably increased expenditure in connection with such necessaries of progressive agriculture."—Carried.

Mr. Mitchell (Natal) proposed: "That this Conference is of opinion that railway rates on South African produce are in certain cases anomalous, a condition of affairs which tends to restrict agricultural progress; that, in order, if possible, to overcome such difficulties as exist, a meeting between the General Manager of Railways and a committee of this Conference should be arranged as early as possible to discuss the subject."—Carried.

Mr. Nicholson (Transvaal) proposed: "That this Union desires to recommend that agricultural machinery consigned over the South African Railways be carried at the rate applicable to South African produce."—Carried.

Mr. Newmarch (Natal) moved): "That, in the opinion of this Union, the charges made for railage on rough timber for mining, building, and firewood purposes act detrimentally upon an important

South African industry, and that the attention of the Government be called to this state of affairs."—Carried.

Mr. Nicholson (Transvaal) proposed: "That it is desirable that the recommendations made by the Commission appointed to investigate and report upon the question of the transit of live stock upon railways in South Africa should be carried out in their entirety."—Carried.

"*South African Bred.*"—Mr. Struben (Cape) proposed: "That, in the opinion of this Conference, the term 'South African bred' should apply to animals at shows that are sired within the confines of South Africa only."—Carried.

Breeders' Associations.—Mr. Scott (Natal) moved: "That, in the opinion of this Conference, the time is now ripe for the formation of breeders' associations, and that the Conference take such steps as may be necessary to assist in the establishment of such associations."—Referred to South African Stud Book Association.

Rural Telephones.—Mr. Tandy (Natal) moved: "In the opinion of this Conference it is very desirable that special attention should be given to the improvement and extension of the telephone systems of South Africa; that increased facilities should be given for telephonic communication over local and trunk lines; and that every effort should be made to cheapen and encourage the construction of farm lines."—Carried.

Transvaal Boring Charges.—Mr. Poulteney (Transvaal) moved: "That the Union desires to support the recommendations of the Transvaal Agricultural Union for the reduction of prices in connection with the use of Government boring machines to a maximum of £2 per day, and that the department concerned be recommended to allot the use of such machines to districts most in need of boreholes."—Withdrawn.

The Agricultural Department.—Mr. S. G. Vilonel (Orange Free State) moved: "That the organization of the Agricultural Department should be one of decentralization." After discussion and a full explanation by the Acting Secretary for Agriculture, this was withdrawn.

Mr. A. G. Robertson (Transvaal) moved: "That this Conference is strongly of opinion that the Agricultural Department of the South African Union should be reorganized upon lines which will give greater powers to the heads of various sections of the department, and that such reorganization should take place on lines, as far as possible, similar to those adopted in America."—Seconded by Mr. R. H. Struben (Cape), and, after further lengthy discussion, was declared carried.

Classification of Sheep.—Mr. Struben (Cape) moved: "That the Congress recommend to show-holding societies under affiliated unions the following classification of merino sheep already adopted by the Cape: (*a*) Rambouillet and allied types; (*b*) Tasmanian and allied types; and (*c*) plain-bodied sheep." These three classifications, based on family distinctions, could, he said, then be sub-divided into fine and robust.—Mr. Oscar Evans (Cape) seconded, but, after discussion, was withdrawn.

Fencing.—The report of the Fencing Committee, consisting of two delegates from each affiliated Union, under convenership of Mr. A. G. Robertson, was placed before the Congress. This report was as follows:—

"1. Standard fence to have six wires, at least 16-lb. iron standards, 3-in. wood poles at the least; poles 15 yards apart; five droppers, to be wood or iron; if the former, to be at least 1 in. in diameter.

"2. That the Cape and Natal law be taken as a model.

"3. That the running line of smooth wires should not be less than No. 6 for the two top wires; the rest may be No. 8. In barbed wires, not more than 500 yards to 100 lb. weight.

"4. It is further recommended that a clause be inserted in the law that the trespass law of the Cape be inserted in the new fencing law of the Union."

Rev. J. Scott (Natal) moved the adoption of the report. Mr. O. Evans (Cape) seconded.

Mr. Struben (Cape) moved as an amendment: "That the Government be asked to bring in a uniform fencing law for the Union and to make provision for variations in detail in accordance with local requirements."—The amendment was carried.

Stock Thefts Repression.—The Rev. J. Scott (Natal) moved: "That this Union urges upon the Government to continue the system of detection of stock thefts which has been in vogue in the Province of Natal for some years, as that system has had admirable results, and but for it many farmers would have had to give up stock, especially sheep-breeding, and that the system be extended to the whole Union."—The motion was unanimously agreed to.

On the motion of Mr. Poulteney, it was further agreed to telegraph the resolution to the Minister of Agriculture in view of the Government's reported decision to do away with the existing Natal force at the end of the month.

Horse Breeding.—The Rev. J. Scott (Natal) moved: "That this Conference recognizes the importance of taking all possible steps towards the improvement of the South African country-bred horse by the establishment of (*a*) some system of licence for public horses at stud whereby freedom from hereditary unsoundness will be ensured; and (*b*) by the placing of Government stud horses within reach of intending breeders at a small fee; also that all Provinces of the Union shall have equal facilities for the purchasing and the use of imported blood stock from the Government. This Conference further suggests that it is highly desirable for the Government to take steps to provide for an adequate supply of remounts for all possible future needs of our South African defence and police forces; also to provide facilities for breeding an adequate supply of mules and donkeys for industrial and military use by some scheme of co-operation with South African horse-breeders leading to the future development of the at present inadequate horse resources of the Union."—Carried.

Grading Wattle Bark.—Mr. Newmarch (Natal) moved: "That, in the opinion of this Union, steps should be taken by Government to provide facilities for determining the tannic contents of wattle bark in order that contracts for supplying bark may be fixed on such basis."—Carried.

Using the Zebra.—Mr. Mitchell (Natal) moved: "That this Conference would call the attention of the Government to the exceedingly valuable asset possessed by South Africa in the large herds of zebras running in the country, and would suggest that steps be at once taken to prove the best means of making use of them for transport and mule breeding."—Carried.

Railway Extension.—Mr. Scott (Natal) moved: "That this Union is of opinion that the future prosperity of South Africa depends to a large extent on facilities for moving produce, and, while approving of what has been done by the Government, would urge the necessity of a rapid extension of railway communication throughout the country."—Carried.

Inspection of Export Fruit.—Mr. R. H. Struben (Cape) moved that the Government be asked to bring forward an Act without delay for the inspection of fruit for export with power of rejection.—Carried.

Vermin Destruction.—Mr. Rubidge (Cape) moved that the Government be urged to introduce legislation "making it compulsory for Divisional Councils or other local government bodies to pay for proofs of the destruction of stock-destroying carnivora, and to contribute on the £1 for £1 principle towards amounts so expended".—Carried.

The other resolutions were all more or less formal.

The next Congress will meet at Pretoria, and the following officers were appointed for the ensuing year:—

President: General Tobias Smuts (Transvaal).

Vice-Presidents: The Presidents of each affiliated Union, viz., Cape, Mr. O. E. Evans; Natal, Mr. C. Mitchell; Transvaal, General T. Smuts; Orange Free State, Mr. G. A. Kolbe; Rhodesia, Mr. R. A. Fletcher.

Executive Committee of six from each affiliated Union were elected as follows: Messrs. J. Newmarch, J. Marwick, G. C. Mackenzie, H. Bazley, H. Tandy, and Rev. J. Scott (Natal); Messrs. P. W. Michau, C. W. C. Kohler, H. R. Struben, P. R. Malleson, J. C. Starke, and W. Rubidge (Cape); Messrs. W. H. Poulteney, W. Pott, E. L. Hunt, N. J. Pretorius, Jan Meyer, and N. J. Reckert (Transvaal); Messrs. J. Marais, C. G. Radloff, S. J. Vilonel, W. Ehrlich, and T. van Reenen (Orange Free State); Messrs. E. A. Hull, H. O. Backhouse, T. Eyles, O. S. Jobling, R. A. Fletcher, and De Kock (Rhodesia).

Importation of Pure-bred Live Stock.

The following returns of recent importations of pure-bred live stock into the Union, via Capetown and Durban respectively, have been supplied by the Department of Commerce and Industries:—

I.—Via Capetown.

Breed and Sex.—Wanganella; seventeen rams and fifty-nine ewes.
Country of Origin.—New South Wales.
Stud-Book in which Registered.—Unknown.
Stud-Book Number or Name.—Unknown.
Importer's Name and Address.—J. F. Badenhorst, Riversdale, Cape Province.

Some interesting particulars relating to the above consignment have also been supplied. One of the rams, No. 0, took first prize at the Bathurst show for two-tooths. Another, No. 35, from Messrs. Kater Bros., Mumbleburn, Warren, is one of a pen of three that took first prize for two-tooths the year before last. The ewes are all from the famous stock of Messrs. Kater Bros. The total value of the rams is stated to be £200, and of the ewes £500.

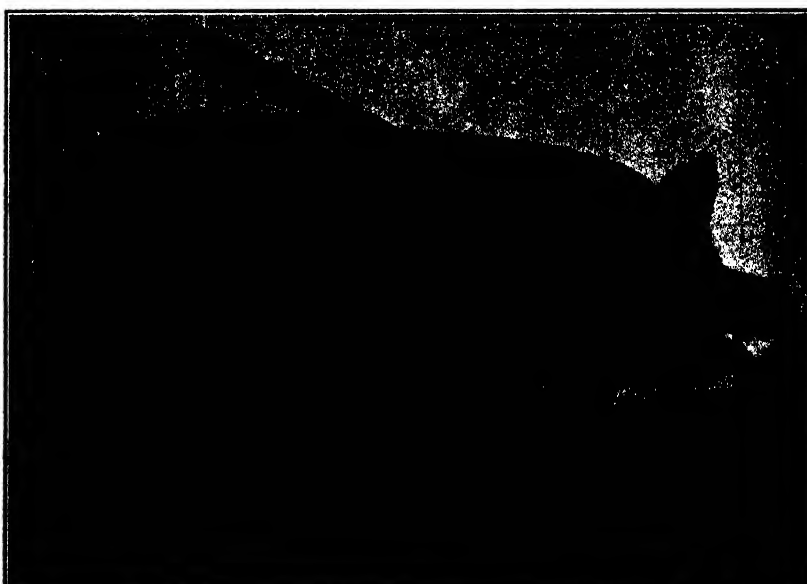
II.—Via Durban.

Breed and Sex.	Country of Origin.	Stud-Book in which registered.	Stud-Book Number or Name.	Importer's Name and Address.
		Ex "Kenilworth Castle", 6th November, 1911.		
Gelding	England	English Stud-Book, vol. 21, p. 422	"Europlydon", No. 716	J. Porter, Durban.
Colt	"	English Stud-Book, vol. 22, when published	Unnamed, No. 717	" "
		Ex "Intaba", 29th September, 1911.		
Bay filly	England	English Stud-Book, vol. 21, p. 95	"Finesse", No. 676	A. Meikle & Co., Johannesburg.
Bay stallion ...	"	English Hackney Stud-Book	"Cayre", No. 10158	J. G. Calderwell, Helpmakaar.
		Ex "Clan Macgillivray", 14th October, 1911.		
Clydesdale stallion	Scotland	Clydesdale Stud-Book, vol. 31	"Forest Laird", No. 14678	J. Moon, Manderston, Natal.
		Ex "Inanda", 2nd November, 1911.		
Mare	America	English Stud-Book, vol. 22	"Swanee River", No. 705	H. de Mestre, Kromdrie. (Hon. H. Wyndham)

Breed and Sex.	Country of Origin.	Stud-Book in which registered.	Stud-Book Number or Name.	Importer's Name and Address.
Ex "Edinburgh Castle", 30th October, 1911.				
Stallion	Scotland	English Stud-Book, certificate 653, vol. 21, p. 123	Unnamed	A. C. Townsend, Pietermaritzburg.
Ex "Umgumbi", 10th November, 1911.				
Chestnut mare ...	England	English Stud-Book, vols. 21 and 22, when published	"Casy", No. 698	H. Tonkin, Durban.
Bay horse	"	" "	"Opportune", No. 699	" "
Bay mare	"	English Stud-Book, vol. 21, p. 694	"Rosinalda", No. 701	" "
Brown mare ...	"	English Stud-Book, vols. 21 and 22, when published, p. 815	"Rapacity", No. 702	" "
Chestnut mare ...	"	English Stud-Book, vols. 21 and 22, when published, p. 273	"Mrs. Findlay", No. 703	" "
Bay mare	"	English Stud-Book, vols. 21 and 22, when published, p. 391	Unnamed, No. 704	" "
"	"	English Stud-Book, vols. 21 and 22, when published, p. 139	"Proud Songstress", No. 700	" "
Ex "Georgic", 23rd September, 1911.				
Merinos— 266 Rams 206 Ewes 1 Gelding	Australia	—	—	W. J. McCarthy, Pietermaritzburg.
Ex "Umsinga", 9th October, 1911.				
Stallion	United Kingdom	Suffolk, vols. 17 and 18	"Boulge Bacchus", No. 3611	Capt. Montgomery, Standerton.
Mare	"	" "	"Boulge Ballista", No. 6414	" "
"	"	" "	"Holton Golden Wedding", No. 6817	" "
"	"	" "	"War Belle", No. 6370	" "
Ex "Georgic", 23rd September, 1911.				
4 Dogs	Australia	No pedigree	—	W. J. McCarthy.
Ex "Glenelg", 30th October, 1911.				
266 Mules... ...	Argentine Republic	No pedigree	—	Karl Schwarz & Calder.

Government Importation of Stock.

In the last issue we gave some details of the thoroughbred stock brought out recently by Mr. J. D. Borthwick, Acting Assistant Principal Veterinary Surgeon (Cape) for the Government, to be distributed among the various agricultural colleges, etc. Some more photos having come to hand, they are reproduced herewith. They include a Berkshire boar and three of the Catalonian donkeys.

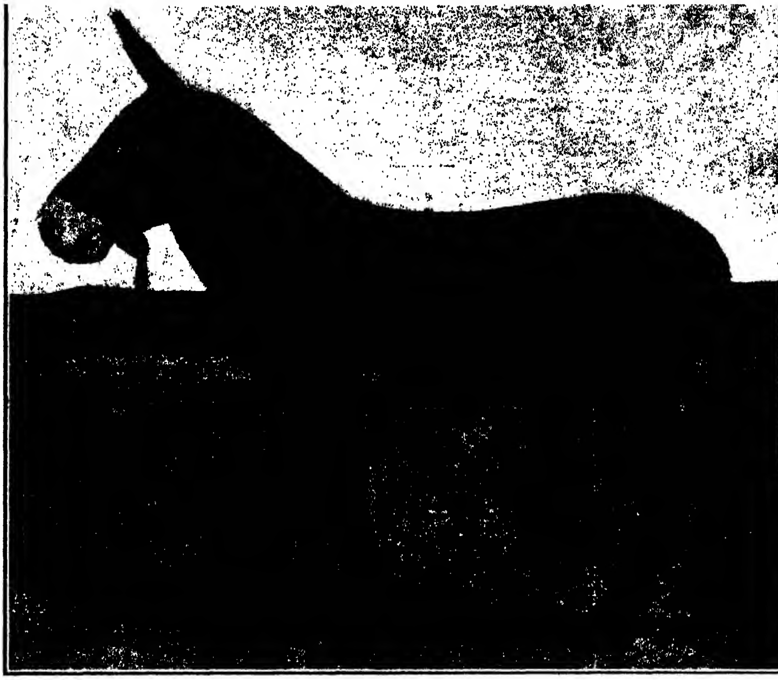


Berkshire boar Crewe Prince II (15921).

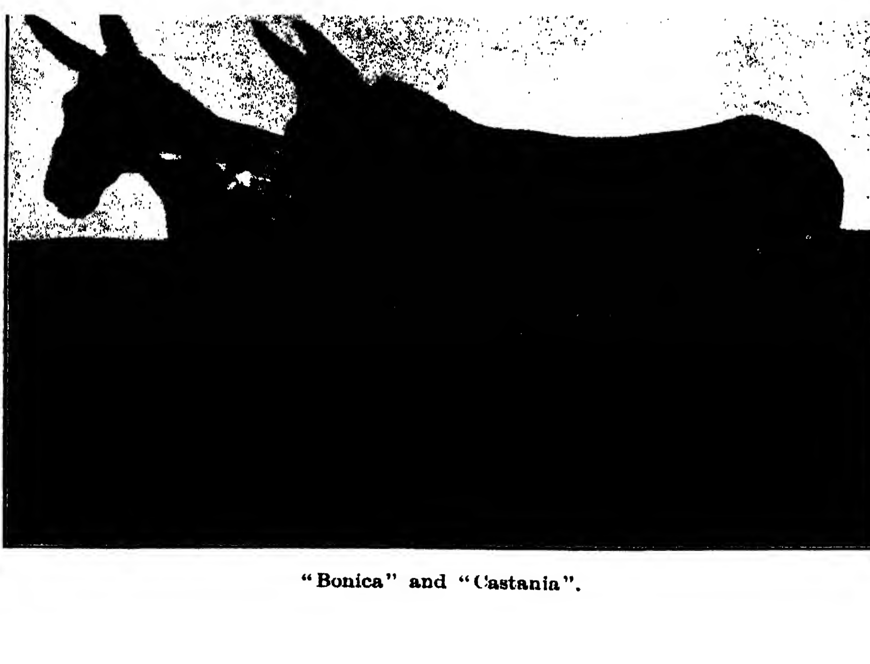
Born 10th September, 1910; sold to I. D. Borthwick, Esq.; shipped on the s.s. "Cluny Castle" from the East India Docks, London, on 28th July, 1911.

Crewe Prince II (15921) won the following, viz.: 2nd prize, Oxfordshire Show, 1911; 2nd prize, Nottinghamshire Show, 1911; 2nd prize, Royal Counties Show, 1911; 2nd prize, Wirral and Birkenhead Show, 1911. Only times exhibited.

Government Importation of Stock.



Catalonian Jack "Volontire."



"Bonica" and "Castania".

Export of Fresh Fruit.

THE following statement, showing description and declared value of fresh fruit exported from the Union of South Africa during the seven months ended 30th September, 1911, has been compiled from returns furnished by the Department of Commerce and Industries :—

Description.	Via Capetown.	Via Port Elizabeth.	Via East London.	Via Durban.	Via Delagoa Bay.	Via Other Ports.	TOTAL.
	£	£	£	£	£	£	£
Apples	797	8	10	13	330	16	1,174
Pears	3,880	—	1	5	216	2	4,104
Bananas	257	—	6	—	—		263
Pineapples	168	300	8	124	—	—	600
Oranges	3,500	624	319	459	69	1	4,972
Naartjes	738	20	1	695	101		1,555
Lemons	57	—	1	—	—	7	65
Grapes	9,914	3	4	-	506	—	10,427
Nuts	38	- -	6	8	22	8	82
All other	2,183*	22	10	29	165	—	2,409*
TOTAL.......... £	21,532	977	366	1,333	1,409	34	25,651

* Includes plums to value of £1027 exported during March and peaches to value of £279 exported during the same month.

Household Science in South Africa.

By Jeanette C. van Duyn.

> "Nothing lovelier can be found
> In woman, than to study household good,
> And good works in her husband to promote."
>
> *Milton.*

That we are on the eve of a great revolution in the educational system of South Africa is a fact which is becoming more apparent every day. Who has not heard of that great movement which just now is causing such profound interest and keen enthusiasm amongst our deep-thinking and progressive women, namely, to introduce the study of household science into the curriculum of girls, or in other words, to prepare girls for that sphere of life for which most of them are destined?

The object of this little effort is to set forth in a concise form the aims of this noble scheme and what we ultimately hope to attain. Most of us are acquainted with the splendid work done by the band of ardent workers of the Household Science Committee in Pretoria, under the able and untiring leadership of Lady Van Boeschoten, but so far we have not been able to penetrate into the rural districts, where we are also anxious to make known our endeavours. Therefore, we hope by means of this publication to explain our project and to give our readers a clearer conception of what household science stands for, as well as the relation it bears to the State and the nation. Further, we earnestly request the co-operation of our readers by not only disseminating its contents, but also by discussing it freely with their friends, and we shall be glad at any time to receive any suggestions or answer any inquiries, addressed to the Secretary, Household Science Committee, P.O. Box 611, Pretoria.

We have no doubt that every far-sighted man and woman, on becoming familiar with our aims and objects, will give us their support and so strengthen and help us to attain our ideals, namely, (1) "To improve the welfare of the women of South Africa", and (2) "To erect a School of Household Science in connection with the National College of Agriculture", which we trust will become a reality at no distant date.

Surely the time is past when a woman is expected to gain her experience through intuitive knowledge or get her instruction from any one who is disposed to give it to her, whether that person be competent or not. It is gratifying to know that the women are beginning to realize their importance to the country and the grave responsibility which rests upon them, for it is truly said that "the hand which rocks the cradle rules the world". No matter what the natural resources of a country are it takes great and good

men and women to make a great State, and such men and women are the products of good homes. It is, therefore, our bounden duty to try and improve and uplift the homes in every possible way. And this can only be done by educating the woman, who stands at the head of the home.

It has become recognized that just as science can be applied to the operations on the farm, so it can likewise take its place in the home. If a man wishes to become a successful farmer he must study the chemistry of his soils, the crops best suited to them, the care and feeding of his stock, etc. And so, too, a woman should be taught the chemistry of foods, the best methods of preparing them, their effect upon health, how to cut out and make garments, how to expend money wisely and obtain the highest value for it, how to

A Student serving a Test Dinner at the Macdonald College, Quebec.

run the house systematically and on the most economical lines, how to care for the sick and render first aid; in fact she should be able to deal intelligently with any emergency that may arise in the home. So we see what a vast field there is for a woman to cover, and in order to do so adequately it is necessary that she should be an efficient person, and efficiency in the art of managing a home and the caring of a family can only be procured through training in the same way as for any other profession—for a profession it certainly is, and a most difficult and complex one too.

Is it not time then to see that our girls' education in household science is no longer neglected? The importance of educating girls in household work has long been recognized in other countries—

Students Working in the Kitchen at the Macdonald College, Quebec.

Great Britain, Canada, United States, France, Germany, Holland, Denmark, Norway, Sweden have long ago established household science schools, and a girl's education in those countries is no longer considered complete unless she has gone through such a course of instruction.

Are we going to be left behind in this great educational race? And is there less need for the daughters of South Africa to be trained for their life's work than their more fortunate sisters beyond the seas? However, we hope soon that provision will be made to elevate and simplify household duties by scientific and systematic training, and in this respect many women are putting forth their best efforts in the furthering of this great cause. There is no doubt that with accurate knowledge comes skill in household affairs, and with skill comes interest in the work, which then becomes a pleasure instead of a monotonous drudgery. Besides, not only do the comfort and happiness of a family depend upon the proper management of the home, but also their health and financial prosperity.

We owe, therefore, a debt of gratitude to Lady Van Boeschoten for having conceived the idea of establishing a school of household science, for which she has started a "Million Shilling Fund". And we want to appeal to all those who have the welfare of the country at heart to show their sympathy in this movement by sending their subscription of one shilling to the Secretary, Household Science Committee, P.O. Box 611, Pretoria. Few of us are too poor to contribute the small sum of twelve pennies, and when we remember that it is for a cause, which is undoubtedly going to be the means of the building up of a great and strong nation, we should not hesitate to give it every possible support. And also, would it not be inspiring for every woman to feel that a single shilling would at least put one brick in the walls of the school of household science? It would make her take a personal pride in it and give her greater interest in the scheme.

It may be said: "But why should not this school be erected by the Government?" Well, we cannot always look to the Government for support, no matter how deserving the object may be, knowing the heavy financial burdens that still rest upon the Union. Besides, we should try to develop voluntary aid in our educational institutions as in America and Canada, where the advance of education is largely due to private benefactions left to public institutions. And, further, we women should show that there is urgent demand amongst all sections of the community that provision be made for the training of girls for their natural vocation in life, namely, home-making, in the same way as boys are trained for their different pursuits in life, whether law, medicine, mining, commerce, mechanics, or agriculture.

The knowledge of household management is of far greater importance to a girl than any other subject, and it should be much more valuable for her to learn how to be a good housewife and have a knowledge of such things which can be applied in her daily life rather than to stand high in such subjects as Latin, Greek, or geometry, which after all will not help her to solve the every-day problems.

Another great argument in favour of training girls along this line is that it will open up new fields in the scope of women's labours. The teaching of household science in our schools throughout South

Household Science.

In the Sewing Room at the Macdonald College, Quebec.

In the Manual Training Room at the Macdonald College, Quebec.

Africa will offer great opportunity for girls; while large institutions, like colleges and hospitals, recognize the value of trained workers and scientifically trained housekeepers, superintendents and dietitians should always be able to command good salaries. Then again a girl may become an instructress or manageress of Young Women's Christian Associations and similar institutions. The other branches in which women could excel and make a living are poultry-keeping, fruit-culture, bee-culture, home-gardening, dairying, etc.

Now a word as to the reason why it has been proposed to erect this school of household science in conjunction with the College of Agriculture. There are many branches which can be studied with mutual advantage by both sexes, such as dairying, poultry-keeping, fruit-growing, gardening, bee-keeping, etc. In this case the same laboratories could be used, thus saving in the expense of buildings as well as of the staff.

Let me briefly give an outline of the various courses which it is proposed should be offered to girls.

1. *Normal Course.*—The Normal course is designed for training teachers in domestic science for the schools of our country, also for classes in country towns and districts. The course would continue for two years, but Normal College students who have second class teachers' certificates would be allowed to take it in one year, with the option of going back later on. Students passing the examinations satisfactorily would be awarded a teacher's certificate in household science.

2. *Home-maker Course.*—This course is to fit girls to deal intelligently with the many problems which daily confront the housewife. The home-maker is thrown very largely on her own resources and should be capable to deal with difficulties as they arise. The duration of this course would be one year, at the completion of which a certificate would be awarded. However, should the student desire to continue her studies, and provided she is of age, she would be allowed to enter the senior housekeeper course. Women entering upon this course should be at least seventeen years of age.

3. *Housekeeper Course.*—This course is designed for those who wish to become professional or skilled housekeepers or dietitians in hospitals, etc. The first year's work would be similar to the home-maker's course, with the object of giving the students a broad general knowledge of all pertaining to a home. The second year would be devoted to special work, the students getting as much practice as possible, as well as housekeeping for large numbers from a business point of view. At the satisfactory completion of the two years a housekeeper's certificate will be awarded. Candidates must have entered their twentieth year, should be in sound health, with executive ability, and should have considerable experience in practical housework.

4. *Short Courses in Household Science.*—This course is arranged for those who cannot spend more than one term at the school. It would provide training in practical work in all branches connected with the home, with as much theory as time will permit, provision to be made for lectures in the evenings. Three short courses would be given each year of twelve weeks' duration each. No certificate will be awarded in connection with this course.

5. *Farmers' Wives Course.*—A course of six weeks would be offered for farmers' wives, and would include such practical subjects

as dairying, home-gardening, poultry-keeping, bee-culture, cookery, dressmaking, lectures on home-nursing, etc.

6. *Optional Courses.*—Optional courses would be given to students who do not wish to take full regular courses, or who wish to take a group of subjects fitting their special needs.

COURSES OF STUDY.

A short description of the work covered in some of the most important branches might give our readers a better idea of what the study embraces:—

FOOD AND ITS PREPARATION.

Practice.—The best method of lighting and managing a fire; regulating the flues; managing the oven, etc.; the management of different ranges in general use for cookery; the difference between a close and open range. Methods of cooking and underlying principles, with illustrative dishes. The changes effected by heat, cold, or fermentation. Different methods of canning and preserving, jelly-making, pickling, candy-making, various processes of bread-making. Different foods in combination; food principles combined to form a balanced diet. Different methods of lightening mixtures. Invalid cookery, etc. Practical work in marketing. Cooking and serving test dinners.

Theory.—Classification of various foodstuffs; their composition; their value in the diet and uses to the body. The nutritive and economic values of food; comparison of total nutrients of different foods; comparative cost of different classes of food; means of reducing cost of meals; digestion and assimilation of food, etc.

HOUSEWIFERY.

The planning and construction of the house, situation and surroundings, drainage, etc. House furnishing and decoration; the treatment of floors and floor coverings, walls and wall coverings; the proper handling of tools, and the making of simple articles of utility; choice and cost of suitable furniture from an artistic and economic point of view; application of principles of colour harmony; remaking of mattresses and pillows; re-upholstering chairs; making cretonne covers, etc.

HOUSEHOLD MANAGEMENT.

This course deals with the organization and management of the home in relation to income, division of labour, etc. Systematic planning of daily and weekly routines. Practical work in care and cleaning of woodwork, metals, such as brass, copper, silver, etc.

Practice is also given to students in housekeeping—every student to take charge of the residence of the Dean of Household Science for a week or fortnight the first and second years—table setting and serving. The keeping of household and institution accounts; methods of saving, investments, and banking.

HOME NURSING.

The care of the patient and the sick-room; making of beds; administration of medicines; preparing and applying of bandages, splints, poultices, hypodermic, etc. Recording of temperature and

pulse; the treatment of burns, cuts, sprains, dislocations, fractures, shock, poisoning, sunstroke, resuscitation from drowning. Care of the baby—bath; care of the eye, mouth, etc. Diet for invalids, convalescents, diabetics, etc. Serving of trays.

LAUNDRY.

To wash white and coloured woollens; the proper way to launder fast and loose coloured cottons, linen, silks, fine muslins, art needlework, embroideries, laces, etc. The making of soap from kitchen grease; removal of stains; dry-cleaning of gloves, silks, etc., and pressing of skirts.

The theoretical part deals with the study of the various fibres, their composition, structure, and method of manufacture; as well as the effect of acids and alkalies on them.

MILLINERY.

Stitches used in millinery; designing and drafting paper patterns for buckram shapes; cutting, making, wiring, covering, and trimming a buckram shape. Making wire frames from given dimensions, also copying from models; covering wire frames in various ways; various ways of trimming.

NEEDLEWORK AND DRESSMAKING.

First Year.—Stitches used in plain needlework and dressmaking; cutting and making of three articles of underwear to fit self; cutting and making of plain skirt and shirt waist.

Second Year.—Designing of dresses; drafting, cutting, and making a fitted lined bodice, boned and finished in detail, fancy waist, and whole dress, etc.

PHYSIOLOGY AND HYGIENE.

The structure and functions of the principal organs and tissues, including circulation, respiration, nutrition, and digestion, the brain, and the special senses, etc. Personal and household hygiene.

SCIENCES.

Such branches as chemistry, bacteriology, biology, and physics will be studied in so far as they enter into the practical side of home life.

South African Irrigation Association.

FIRST ANNUAL CONGRESS.

The first annual congress of the recently formed South African Irrigation Association was opened in the Town Hall, Bloemfontein, on Thursday, 16th November, by the Minister for Lands and Irrigation, the Right Hon. A. Fischer. There was a large attendance of members of the association and delegates from various parts of the country when the business opened, as well as a fair sprinkling of the general public.

On calling the roll the following were found to be present:—

The President, the Hon. Sir T. W. Smartt, M.P.; vice-presidents: the Hon. Senator Charles Southey (Cape), the Hon. A. G. Robertson, M.P.C. (Transvaal), the Hon. C. H. Wessels (Orange Free State), and the following members:—Messrs. Hougham Abrahamson, Hougham Dale, Longhope; J. B. Franklin Adams, The Grange, Parys; S. Bekker, Aliwal North; G. Baumann, Bloemfontein; J. A. v. d. Byl, Irene, Pretoria; A. H. Bennett, The Homestead, Winterton, Natal; Frank Biggs, Brooklyn, Graaff-Reinet; H. M. Barber, Hilton, Venterstad; A. P. Burger, Wilge River, Nuy; J. W. Baker, Laughing Waters, Willowmore; H. Coetzee, Wilbedacht, Oudtshoorn; H. Grey Collett, Greyville, Collett Siding; E. W. MacDonald, Drummond Whittlesea; J. E. Dyer, Haaskraal, Potchefstroom; J. G. van Dyk, Calvinia; Frank Douglass, Lifford, Grahamstown; O. E. G. Evans, East Poort; E. T. L. Edmeades, Oudtshoorn; Fred Eyles, M.L.C., Salisbury, Rhodesia; W. Elliott, Grootdam, Maraisburg; H. W. Fourie, Uitkuil, Colesberg; J. T. Fourie, Frankfort, Westminster; L. Geldenhuys, Johannesburg; H. T. Greef, Endeavour, P.O. Holfontein; N. H. O. Gavin, Wynands River, Oudtshoorn; R. Hockly, Gongona, Fort Beaufort; G. A. Kolbe, Bethulie; W. F. King, Bedford; D. C. Lourens, Kopjes; Gen. L. A. S. Lemmer, M.P., Marico; J. N. v. d. Merwe, Calvinia; J. A. v. d. Merwe, Oudemuir, Calvinia; A. H. Mulder, Armoed, Oudtshoorn; J. G. Meyer, Johannesburg; Paul Nel, Paarde Kraal, Beaufort West; C. J. Nortje, Armoed, Oudtshoorn; C. Newbury, Clocolan; J. G. Potgieter, Oudtshoorn; J. F. Parkes, Horse Shoe, Bethulie; J. Quinn, Peninsula, Grahamstown; D. de Vos Rabie, Nuy; W. H. le Roux, Bakensdraal, Oudtshoorn; L. J. Roberts, Baddaford, Fort Beaufort; G. Rayner, Tarka Bridge, Mortimer; W. Rubidge, Dalham, Graaff-Reinet; R. Richards, Selborne, Addo; A. Struben, Pretoria; R. H. Struben, Tafelberg; Charles Scott, Strathmore, Klerksdorp; E. Thornton, Blaauw-water, Graaff-Reinet; H. E. Trollip, Schoombie; J. Thomas, Kamnatie, Oudtshoorn; S. W. Vorster, Buffels Vallei, Rosmead; P. R. van der Westhuizen, Oudtshoorn; P. Weyer, De Toekomst, Waterford; Paul J. de Wet, Zand Vleit, Ashton; M. J. Wepener, Johannesburg; C. J. van Zyl, Carnarvon; H. C. van Zyl, Goedemoed, Klaasvoogds, Robertson.

In addition to the members there were also present: The Right Hon. the Minister for Lands and Irrigation (Mr. A. Fischer), the Hon. the Administrator of the Orange Free State (Dr. Ramsbottom), his Worship the Mayor of Bloemfontein (Mr. Ehrlich), the Rev. B. P. Marchand, the Acting Director of Irrigation (Mr. F. E. Kanthack), with Messrs. Hurley (Assistant Director), Newman, Collins, Kleyn, and Van Reenen, of the Irrigation Department; Mr. F. B. Smith, Acting Secretary for Agriculture; Dr. C. F. Juritz, Acting Chief Chemist; Mr. E. J. Macmillan, Acting Under-Secretary for Agriculture, Orange Free State; Mr. Alex. Holm, General Manager, Experimental Farm, Potchefstroom; Mr. J. M. Garrett, Agricultural College, Middelburg (Cape); Dr. E. A. Nobbs, Director of Agriculture, Rhodesia; Mr. W. M. Watt, Government Irrigation Engineer, Rhodesia; and the hon. secretary and treasurer, Mr. F. D. MacDermott, Agricultural Department, Pretoria.

The Right Hon. the Prime Minister (General Botha) and the Minister for Railways and Harbours (Mr. J. W. Sauer) were unavoidably prevented from attending, but each sent messages of sympathy and deep interest in the proceedings. A number of members also wrote and telegraphed their regret at not being able to be present.

The President (Sir T. W. Smartt) initiated the proceedings by inviting the Right Hon. the Minister for Lands and Irrigation to declare the congress open for business.

Mr. Fischer, in acceding to the request, assured the delegates that it was a great pleasure to him to be there, and for many reasons, the chief of which was, perhaps, that it had been hinted to him that he would not be expected to deliver an address or make a speech. That, he said, was a gathering for practical business, and they wanted no platitudes on the subject of irrigation from people who knew less about it than they did. He was exceedingly glad to see so large a congress, the more so as it was not a "talkee-talkee" congress, but a congress determined seriously and earnestly to tackle this great problem, which, in the past, if it had not been neglected, had not, at any rate, been faced as it should have been. The Government was prepared to give every encouragement not only to the congress as constituted, but to irrigation generally. (Applause.) As they knew a good deal had been done in the past, considering the circumstances of the country. They owed a lot to individual effort, but the time had come for more than individual effort. (Hear, hear.) They wanted a pulling together throughout the country for the improvement of the irrigation laws and the regulations under them, and they wanted these not only on the Statute Book and in pamphlets, but reduced to actual practice on the ground (Applause.) They knew that the good old Roman-Dutch law had up to now in great measure sufficed to give them principles to go upon in working with water and dealing with its division and the rights concerning the same. It was wonderful how well this law had been made to apply in South Africa and how sound the reasoning had been in the application, but they had to acknowledge now that their unique wants and extended experience made it impossible for them to rely any longer merely on the old law-books and the case-law so admirably laid down by their judges. When they remembered that the Roman-Dutch law came from a country not so much interested in getting water on to land as in getting it off, it was wonderful how

it had provided so well for others who were situated differently. The first principle laid down was that no man owned what was intended for all—that in public streams there were rights only of user and not of ownership—and it was for them to make that principle even clearer, and to provide further for the reasonable and equitable use of water. The doctrine, in broad principle, was in the common law, and the courts had tried to extend it to meet wants as they arose. But at last they had got to a state when these principles had to be extended further. The Parliaments of the Cape and the Transvaal had tried to find ways of doing that, and that work they now had to carry on. Water was scarce, and it was still running to waste wholesale. As a lawyer himself, he wished to warn them against lawyers. (Laughter.) If they were going to wait for a perfect law, from the point of view of lawyers, many more million tons of water would yet run to waste. (Hear, hear.) But they could always meet more and more of the wants and needs around them and, therefore, what they required was not so much things on paper, as the understanding by practical men of how to stop the waste of the valuable water now running down to the sea, how to provide in time of plenty for the time of want. (Hear, hear.) The Bill which would be laid before them was not perfect, but, he thought, a distinct step in advance of what they had to-day, something of which practical men could understand the spirit, even if there was a want of altogether clear expression about the words used. (Applause.) He promised them, concluded the Minister, amid continued applause, the hearty co-operation of the Government. This matter was not one of party but of truly national interest—(cheers)—and it was one of those problems which could never be solved altogether, although it could be brought nearer and nearer solution by gatherings of practical men such as they had that day. To them the Government looked for advice as to how laws had worked in the past and as to what they thought of the law proposed, and he promised them that what they said would have the most serious attention of himself, his Department, and the whole Government. (Cheers.)

WELCOME TO BLOEMFONTEIN.

On the invitation of the President,

The Administrator (Dr. Ramsbottom) said he was delighted to have the opportunity of saying a few words of welcome to the congress. He did not know how many congresses he had welcomed to Bloemfontein that year, but he could assure them that Bloemfontein had not had too many and would be only too glad to welcome more. (Laughter and hear, hear.) Recognizing their central position in South Africa, they hoped that all the important congresses of the Union would be held in Bloemfontein. (Hear, hear.) As far as that congress was concerned, the question of water touched them in the Free State more than any other part of South Africa—not that they did not get rain, but they did not conserve the water when they got it. He hoped a means would be found of preventing this waste, and he was glad that that important congress, which was going to attempt to find that means, was sitting in the Orange Free State and in Bloemfontein. (Applause.)

The Mayor (Mr. Ehrlich), in extending the city's welcome to the congress, drew attention to the steps already taken by Bloemfontein

to impound water running to waste down to the sea. They had, he said, two great weirs across the Modder River, and there were also other important works connected with the subject to be discussed by the congress, which, he hoped, members would visit with profit and pleasure. (Applause.)

The thanks of the congress to the Minister of Lands, the Administrator, and the Mayor were conveyed by acclamation.

ANNUAL REPORT OF THE EXECUTIVE COMMITTEE.

The congress then proceeded to business, the President calling upon the secretary to read the first annual report of the executive committee. The report was read as follows:—

In presenting its first report your executive committee deems it desirable to call attention to the fact that the period covered dates from the Irrigation Congress held at Potchefstroom in May, 1910, under the auspices of the late Transvaal Government. At that congress this association was formed, the constitution being then drafted and adopted. The governing body was also selected at the same time. But the vital work of organization and construction had yet to be done and some delay occurred at this stage, partly owing to the political changes consequent upon the advent of Union. It was not until the beginning of August that a serious beginning could be made when your present secretary accepted office. Unfortunately, further delay occurred arising from the acting secretary's serious indisposition, but, this notwithstanding, by the close of the year so much had been done that the association was then practically on its feet. A membership of seventy had been secured and a general interest created and fostered throughout the country. This led to a further rapid inflow of members until the roll to-day has a fairly respectable total of 170, including two life members, while others have promised to join.

Early in this year the governing body met and nominated the existing executive committee, and the latter at once proceeded to the necessary formalities required to place the association on a sound business basis. Since then the association has steadily advanced in strength and influence and your executive is sanguine of the future. The financial statements laid on the table will show that this very important phase of the organization has also been satisfactorily established. Thanks to the support accorded by the Government to the movement, combined with economy in administration there is a sound credit balance in the bank. This gratifying state of things should enable the association to proceed confidently with the labours it has set out to accomplish, and your executive most earnestly trusts that these may be crowned with success.

Your executive made every effort to arrange for this congress to assemble at an earlier date, but was prevented from doing so by a succession of events which would have caused it to clash with other important fixtures. It is sincerely hoped, however, that this unavoidable delay, though throwing the congress into a period of busy activity with the majority of our farmers, may not militate against the value and usefulness of the results of your deliberations. The business to be placed before you is fully set out in the agenda. The principal item is, naturally, the Draft Irrigation Bill, formulated to give a common law for the whole of the Union. No more

important subject could be discussed by this association, and as it is necessarily a document of some length, your executive decided to curtail all other business, so far as possible, in order to give members time for full debate and consideration. Among the other business will be the election of officers and a governing body for the ensuing year.

Your executive, in conclusion, welcomes the members to this, the first congress of the association, and also desires to place on record its deep appreciation of the interest accorded in this movement by the Government through the Hon. the Minister for Lands and Irrigation. It also desires to thank Mr. Fischer for kindly consenting to open this congress, and the Director of Irrigation for his presence here and the helpful counsel it is hoped the members may obtain from that officer.

THE PRESIDENTIAL ADDRESS.

The President, in moving the adoption of the report, commented with satisfaction upon the size of the gathering, which, he assured the Minister of Lands, represented the largest and most practical irrigators throughout the length and breadth of the Union. He also expressed pleasure at the presence of Rhodesian representatives, because, he said, although Rhodesia was not yet privileged to form a part of the Union, the interests of the farmers of Rhodesia were the interests of the farmers of the Union, and, therefore, they were delighted to see them. He had, he proceeded, been extremely pleased to hear from Mr. Fischer that the association would have every possible assistance from the Government, because the Government could assist them in many ways. (Hear, hear.) They heard it stated that South Africa was drying up, and there was undoubtedly truth in the statement. But any man who had given attention to the subject must recognize that this drying-up was due entirely to the fact that flood waters were not stored. If they did their duty in conserving flood water, he was sure that would give them the necessary evaporation and increase of rainfall to check the process of drying up. (Hear, hear.) In railway construction it was absolutely necessary to allow for a free flow of flood water over the country, as intended by nature. (Hear, hear.) Nothing had struck him more, coming up in the train, than the frequency with which one saw the vleis in beautiful condition on one side of the line and barren wastes on the other. The congress, he thought, should impress it upon the Government that the most definite instructions should be issued to prevent this in future in railway construction, even if it should mean increased cost. (Applause.) Then, he would like to draw the attention of the Government to that admirable law of the United States, the Reclamation Law, for the preservation of the natural resources of the country. Under such a law the proceeds of the sale of Crown lands were set aside and devoted to public reclamation services for the purpose of increasing the country's resources. (Applause.) There was no doubt that the majority of irrigation works would always be done by private enterprise, and in the midlands of the Cape Province the farmers had already reclaimed the country to a most extraordinary degree. (Hear, hear.) But he hoped that every assistance that could be legitimately given by the Government would be given—(hear, hear)—because, as Mr. Fischer had

rightly said, this was a national question, which ought to be absolutely dissociated from party considerations. (Applause.) When this Bill had passed throuh the congress and when it came before Parliament, Mr. Fischer would receive from the gentlemen who co-operated with him (Sir T. W. Smartt) the most cordial assistance, and he hoped that it would not take Mr. Fischer two years to pass his Bill, as it had unfortunately taken him (Sir Thomas) to pass his Irrigation Bill through the Cape Parliament some five years ago. (Laughter and hear, hear.) He then went on to urge the importance of afforestation and forest conservation in the interests of the streams of the country, and the necessity for establishing Government experimental stations all over the country, because the construction of works was the easiest thing about irrigation and the really difficult thing was to know about the different descriptions of crops to sow and the periods at which it was most advisable to apply one's water. At present farmers were groping in the dark and finding out these things for themselves by bitter experience. In conclusion, he uttered a warning against hasty and ill-advised schemes of irrigation and spoke of the necessity for the hurrying on of proper and thorough hydrographic surveys by the Government, so that farmers might know exactly where it was possible and where not to construct irrigation works. His experience had shown him, he said, that a new era had opened in the country and that the farmers were prepared to take their share in the development of the great resources of the country and had taken as their motto the words in the Book of Kings: "Make this valley full of ditches for ye shall not see wind, neither rain, but this valley shall be full of water." (Cheers.)

The report of the executive was unanimously adopted.

Mr. Oscar Evans (Cape) proposed that the hours of sitting be as follows:—From 9 to 11 a.m., from 11.15 to 12.45 p.m., from 2 to 4 p.m., from 4.15 to 6 p.m., from 8 p.m. onwards to as late as was found necessary.

This was agreed to unanimously.

The Chairman suggested that before they began a discussion of the Draft Bill the Director of Irrigation give the meeting his views on the measure. (Applause.)

THE DRAFT IRRIGATION BILL.

EXPLANATION BY THE DIRECTOR.

Mr. Kanthack (Director of Irrigation) submitted the following statement:—In inviting this congress to freely discuss the draft Union Irrigation Bill, I am presuming that no apology for introducing a consolidating Bill of this nature is necessary. It is apparent, however, that even in the most advanced irrigating districts of the Union people have the most vague ideas regarding, firstly, the existing water law itself; secondly, its shortcomings; and finally as to hydrographic conditions outside the district concerned as affecting the use of water for irrigation and other purposes.

In a country like South Africa, climatic, hydrographic, and agricultural conditions are of extraordinary diversity, and in this respect we need not consider the Union as a whole. The Cape Province contains within itself extremes of diversity such as do not

exist in any other Province, and I wish all who are interested in water legislation in the Cape and Transvaal Provinces to clearly understand that Union is not the cause of disturbance in the system of water legislation. On the contrary the Union of South Africa must be looked upon in this connection as a convenient means of revising the Cape Act of 1906 and the Transvaal Act of 1908, both of which have been found not only inadequate but positively hampering to the cause of irrigation development.

The past history of water legislation is briefly as follows:—In the Cape no attempt at statute law was made till case law, based upon Roman-Dutch common law, had so bound things up and created so many vested rights that any drastic departure from common law became impossible. Cape Province law has been built up mainly on comparatively small issues. Being based upon a legal code which was evolved in some of the most humid and water-logged parts of Europe, the most essential factor of a water law in an arid and semi-arid country—conservation, spelt in very large capital letters—was steadily ignored, and the requirements of the country as a whole have been sacrificed to the sacred but often theoretical rights of individuals. The Cape Irrigation Act of 1906 introduced very little new fundamental law; it merely consolidated, and its value is mainly in the direction of administration. It is but a few years ago that irrigation, except in Oudtshoorn, was but a trifling affair. During the past few years, and largely due to the 1906 Act, irrigation development has taken place on a vast scale in those parts of the Cape Province having problems of a totally different character, and in a few years to come the old pioneer irrigation districts of Oudtshoorn, Worcester, Stellenbosch, etc., will account for but a small proportion of irrigated Cape Province. The great areas to be brought under water in South Africa are situated in the Cape and Free State Karoo, in the southern portion of the Transvaal, and portions of Griqualand West, and Bechuanaland. Compared with what can be done in South Africa the irrigation which has been effected in the pioneer areas of the Cape is but small. It is obvious, therefore, that our national water law should be framed in such a manner as to facilitate in every respect conservation of water and irrigation development, and to effect this the Cape Acts of 1906 and 1909 require very material amendment. I need not say much about the Transvaal Act. Considering the free field which existed in the Transvaal the common law principles of the Cape Act were much too closely adhered to. On the other hand an effort to simplify some of the really good provisions of the Cape Act has had the effect of making the Transvaal law unworkable, and the Cape system of irrigation boards, river boards, and water courts has been adopted.

The Orange Free State contains, in its southern portions especially, great possibilities for irrigation, but the total absence of water law is hampering this development very greatly. Natal, owing to topographical, physical, and climatic conditions is somewhat different to other Provinces as regards irrigation, but a proper water law is none the less badly needed, as apart from irrigation, domestic supplies, and the development of water power must necessarily be controlled.

No irrigation law can be framed which will work with the precision of, for example, an Act controlling the importation of

stock, or the sale and storage of explosives. To obtain such precision would necessitate special laws for very small areas. Water legislation in a country like this must be elastic to the fullest extent, and the value of any law of this kind must necessarily depend on the efficiency of the administration created by the Act.

The Bill before you is an effort to fulfil the following main requirements:—

(*a*) Preserve all vested rights, so far as they are of practical value to riparian owners.

(*b*) Provide for a rational and practical method of effecting an equitable distribution of water flowing in defined channels of a permanent character.

(*c*) Provide equitable and practical means for the conservation and use of that portion of the flow in our streams which cannot be immediately and beneficially used and is at present running to waste.

(*d*) Provide machinery for effecting the above requirements.

There are many special matters dealt with in the Bill, but the principles just enumerated are the essence thereof.

Great objection is taken in some quarters to the departure in this Bill from the time-honoured practice of dividing streams into perennial and unperennial or intermittent. This distinction is, for a country like South Africa, unstable and unworkable. I realized very soon after the passing of the Cape Act of 1906 that this basis of differentiation and the principles of distribution founded thereon as contained in Sections 6 and 7 of the Cape Act would have a most hampering effect on irrigation development in the Cape and lead to endless litigation. It would, I think, be difficult to frame legislation more calculated to fill the lawyers' pockets than the provisions of Sections 6 and 7 of the Cape Act.

The Cape Irrigation Act Amendment Act, No. 40 of 1909, introduced a far-reaching innovation by drawing a distinction between "normal flow" and surplus water in a public stream. The Bill now before us has carried the provisions of Act No. 40 of 1909 to its only logical conclusions. If delegates will keep all these facts clearly in their minds I am sure no difficulty will be found in appreciating and approving of the Bill.

DEFINITION OF "NORMAL FLOW".

In going into this matter he had decided to submit the following amendment of the definition of the term "normal flow" as it appeared in Clause 2 of the draft Bill:—"Normal flow" shall, in relation to a public stream, mean the average quantity of water actually and visibly flowing which, under a system of direct irrigation by furrows from the stream and without the aid of storage, can be beneficially used for the irrigation of land riparian to the stream without detriment to the interests of lower riparian owners on the stream; provided that storage shall not be held to include the impounding of such share of the normal flow as a riparian owner is or may become entitled to by virtue of a lawful distribution of the normal flow of the stream: Provided that a public stream shall not be deemed to have a normal flow unless a portion of the actual flow be derived from springs, seepage, melting snows, the steady drainage from swamps or vleis, or other like sources of supply.

WHAT IS NORMAL FLOW?

Much of the opposition to the Bill, added the Director, was based on misapprehension, and he believed that the whole discussion turned on the words "normal flow". They must give the term a wider application to include all such portions of the flow in public streams which could be made use of without storage. Only waste water after all irrigation needs were satisfied could be called surplus water. The principles of the Bill might mean an alteration in the wording and he had amended the definition of the words "normal flow", and he hoped that would be the basis of an agreement. The present Karoo streams would only run about three or four times a year, had no normal flow, but was flood water only. The normal flow must include water which went from the usual perennial stream, including seepage. If a dry stream became perennial then they began to have a normal flow which had been and was the case in many rivers.

Mr. Evans (Cape) asked what was the difference between a perennial stream and "normal flow".

Mr. Kanthack deprecated a strict definition between the two terms. They had to get down to a rational definition of the terms, as the present definition was unnatural and there was no such definition. Midland farmers dealt with flood water and not perennial streams, to a large extent, in their irrigation works. On the Sundays River, for instance, it had been largely left alone and it would be called an intermittent stream. Yet it was largely flood water that was used there. Now they wanted to knock out the word perennial altogether and have all water in rivers, whether dry or perennial, dealt with under one head and called public water or streams with a normal flow as capable of being used for irrigation. This would allow a much wider and free use being made than was the case at present.

Mr. Evans asked whether if by development work a farmer created a supply, would a farmer with a long river frontage be entitled to the leakage of the water from high up? He only referred to water which did not exist before, and which he considered a man had developed by his own energy, and should be entitled to that water.

Mr. Kanthack said that it would depend greatly upon whether such a man could absolutely and clearly prove the extra water to be due to his efforts. Such a case occurred at Newlands, Capetown, and the Supreme Court had decided that the water belonged to the man who had produced it. It was purely a matter of sufficient evidence being available.

Mr. Evans said he referred to a virgin spring which had never existed before but was produced by the use of flood water by the farmer on his property.

In reply to Mr. Rubidge (Cape),

Mr. Kanthack said that lei-dams would be defined by the water boards according to districts. What was a lei-dam in one district would not be such in another district. They could only lay down broad principles in the Act, leaving the details to be worked out in each district according to circumstances.

Mr. J. H. Schoeman, M.L.A., considered that a man was only entitled to the use of such water as was due to his own energy and enterprise and work.

Replying to Mr. A. W. Struben,

The Director said he was prepared to include pumping in the term "immediate use of normal flow" so long as no storage was necessary. Surplus water was such as could not be directly used for irrigation but was stored as being more than required in the first instance. If a proper distribution was made of the normal flow the farmer could store his own share in lei-dams by night or day.

At this stage the congress adjourned for lunch, the debate on the Bill being adjourned for the purpose of having Mr. Kanthack's explanation of the Bill printed.

On resuming after luncheon, Mr. R. W. Newman, of the Irrigation Department, read a short paper on "Small Paraffin and Petrol Motors for Irrigation", which was keenly discussed. A hearty vote of thanks was passed to Mr. Newman.

A paper by Mr. O. E. G. Evans on "The Ostrich in Relation to Irrigation Farming in South Africa, with some Practical Hints on Ostrich Raising", was next read, and another full and interesting discussion followed, which ended in a vote of thanks to the author. The papers were all printed in the agenda in full, in English and Dutch.

THE IRRIGATION BILL RESUMED.

The Director's statement having been printed and circulated the debate on this exhaustive subject was resumed.

Mr. N. H. O. Gavin called attention to the position which was whether the definition of "normal flow", as suggested by the Director, was to be accepted or not. He formally moved the acceptance of the Director's suggestion. Mr. S. W. Vorster seconded.

After discussion,

Mr. R. H. Struben moved to insert the words "or other direct means" after the word "furrows".

Congress then adjourned until 8 p.m.

EVENING SITTING.

On resuming in the evening the proposed definition was again debated at some length, during which

Mr. O. E. G. Evans moved as an amendment that the word "actual" before the word "flow" near the end be deleted; and the words "sufficient for common use for irrigation purposes" be inserted after the word "flow". Seconded by Mr. Mulder.

This amendment and that of Mr. R. H. Struben were both adopted, and the definition as amended was carried.

The amended definition reads as follows:—"'Normal flow' shall, in relation to a public stream, mean the average quantity of water actually and visibly flowing which, under a system of direct irrigation by furrows or other direct means, from the stream and without the aid of storage, can be beneficially used for the irrigation of land riparian to the stream without detriment to the interests of lower riparian owners on the stream; provided that storage shall not be held to include the impounding of such share of the normal flow as a riparian owner is or may become entitled to by virtue of a lawful distribution of the normal flow of the stream; Provided that a public stream shall not be deemed to have a normal flow unless a portion of the flow sufficient for common use for irrigation purposes

be derived from springs, seepage, melting snows, the steady drainage from swamps or vleis, or other like sources of supply."

The congress then proceeded to consider the Bill in detail, taking Chapter II clause by clause.

On clause 11,

Mr. Gavin moved to expunge sub-section 2. Withdrawn after explanation and discussion.

On clause 12,

Mr. Gavin moved that this clause be expunged and the following new clause be substituted:—"Every riparian owner shall have the right to impound and store in a reservoir constructed in or outside the channel of the stream so much of the normal flow and surplus water as he may be legally entitled to, or become entitled to, by virtue of a lawful distribution."

Discussion followed and the motion was withdrawn.

On clause 13,

Mr. Gavin moved to insert the words "a reasonable share of" after the word "use". This was carried and the clause as amended was adopted.

Congress adjourned at 10.20 p.m.

SECOND DAY, FRIDAY, 17th NOVEMBER.

The President (Sir Thomas Smartt, M.P.) took the chair at 9 a.m.

Congress immediately proceeded to the election of officers for the ensuing year, with the following results:—

President.—Sir T. W. Smartt was unanimously re-elected president on the nomination of Mr. Dirk de Vos Rabie, seconded by Mr. J. H. Schoeman, M.P.

Vice-Presidents.—Senator the Hon. Chas. Southey (Cape), Mr. A. G. Robertson (Transvaal), the Hon. C. H. Wessels (Orange Free State), Mr. E. W. Evans (Natal), Mr. F. Eyles, M.L.C. (Rhodesia).

Governing Body.—Free State: Messrs. G. A. Kolbe, D. Lourens, J. H. Hertzog, G. Baumann, C. Newberry; Transvaal: General Lemmer, and Messrs. J. Wepener, J. A. Neser, H. A. Baily, J. G. Meyer, A. M. A. Struben, J. A. v. d. Byl, and Melville; Natal: Messrs. A. Stuart, J. Marwick, E. J. van Rooyen, H. Lax, and A. H. Bennett; Cape: Messrs. W. Rubidge, O. E. G. Evans, E. T. L. Edmeades, J. N. van der Merwe, J. H. Schoeman, D. de Vos Rabie, S. Bekker, L. J. Roberts, F. Douglas, H. C. van Zyl, Paul Nel, and S. W. Vorster.

Auditors.—Messrs. C. van Zyl and Gavin were appointed auditors.

NEXT CONGRESS.

A telegram from the Town Clerk, on behalf of the mayor and corporation, inviting the congress to sit at Maritzburg next year was read by the secretary.

Mr. A. Mulder extended a hearty invitation to the congress to sit at Oudtshoorn next year. This was supported by several other Oudtshoorn members.

Mr. De Wet proposed Pietermaritzburg. Mr. Rubidge, Graaff-Reinet, and Mr. Gray Collett proposed Middelburg (Cape).

On going to the vote an overwhelming majority favoured Oudtshoorn, and this centre was accepted.

THE IRRIGATION BILL AGAIN.

Discussion on the Bill was again resumed.

Mr. Gavin moved a new clause to be inserted after clause 73 to read as follows:—

"When any river derives its supply in part or as a whole from tributaries such river shall not be entitled to any water from such tributaries other than surplus water, and the said tributaries shall not store or impound any surplus or flood water until the conditions contained in clause 2 are fulfilled."

The Director of Irrigation having intimated that he was prepared to consider this view the motion fell through.

On clause 14,

Mr. Gavin moved to insert the words "and surplus water", after the words "normal flow", in section 2.

The Director offered no objection. Carried.

On clause 15,

Mr. Gavin moved to delete the words at the end of paragraph (*b*), "he proposes to construct any storage or diversion works within the same catchment during a period of five years succeeding the said date", and substitute the words "he or they will be affected by such award".

Mr. Edmeades seconded, and a lengthy discussion followed.

Ultimately the motion was withdrawn, and

Mr. Gavin moved: "That it be a recommendation to the Director of Irrigation to amend this section of the Bill in such manner as to allow a lower proprietor at any future time the right to claim a portion of the surplus water on a basis of a fair compensation." Mr. Nel seconded.

The Director promised to consider this, and the clause was adopted as printed.

Congress then adjourned for lunch.

The whole of the afternoon was devoted to the Bill in detail, but few important changes were made.

Mr. Gavin urged that all regulations made under the Bill should be first approved by Parliament. This received support.

In the evening the balance of the Bill was discussed from clause 104 to 136, and all adopted practically as printed. In conclusion,

The President moved, and it was carried unanimously: "That this congress approves of the Draft Irrigation Law with the amendments adopted and the suggestions tendered for the consideration of the Director of Irrigation."

The President then most cordially thanked the Director of Irrigation for his patient attention to the points raised in the lengthy discussions and the careful manner in which he had made the complex points so clear. He moved a hearty vote of thanks to the Director and his staff. Carried with acclamation.

Mr. Kanthack, in reply, expressed his appreciation of the spirit of co-operation and compromise in which delegates had met him. He was sure, he said, that as the result of the congress the passage

of the Bill would be enormously facilitated, because the support of the practical man was three-fourths the battle. (Hear. hear.)

NOTICES OF MOTION.

The congress then proceeded to deal with the notices of motion on the paper, most of which were withdrawn as having been disposed of in the discussion on the draft law or irrelevant to the business.

Mr. Carel van Zyl (Carnarvon) moved, seconded by Mr. Bennett (Natal), and carried:—

(1) That it is in the interests of South Africa that a rebate should be given on all material carried over the South African Railways which is required for irrigation purposes, the rebate to be equal to that which is now given where a ton of material is carried.

(2) That provision should be made in the laws of South Africa that Divisional Councils should be compelled to place walls across all abandoned roads to prevent sluiting.

CONSTRUCTION OF EARTHEN DAM.

The last business was an interesting discussion of a paper on the "Design and Construction of Earthen Dams" by Mr. F. A. Hurley, Acting Assistant Director of Irrigation.

On the motion of the Chairman, a hearty vote of thanks was awarded Mr. Hurley for his address.

VOTES OF THANKS.

This finished the agenda and the last business was votes of thanks.

The President formally moved votes of thanks to the Minister of Lands, the Administrator of the Orange Free State, the Mayor of Bloemfontein, the Bloemfontein and Ramblers Clubs, the Municipality of Bloemfontein for the use of the hall, and the Press for the excellent reports. These were all carried with acclamation.

Hearty votes of thanks were given to the President, the Hon. Secretary and Treasurer, and the Director of Irrigation.

This closed the congress and the delegates dispersed to meet at Oudtshoorn next year in October.

East Coast Fever in Northern Transvaal.

THE POSITION TO-DAY.

By W. Cordner Cavenagh (Adviser to Land Board).

Countries from time to time have been visited by scourges which have devastated the stock of the particular country invaded. For instance, the stock of Great Britain was devastated by rinderpest previous to the year 1877 and by pleuro-pneumonia previous to the year 1898. Foot-and-mouth disease from 1849 to 1852 spread through the length and breadth of Great Britain. Such contagious diseases as mentioned not only devastated the stock but caused huge financial loss. I have no records at my disposal showing the actual monetary loss the above diseases bring about, but, for example, from 1st January, 1908, to 30th November, 1909, the London County Council paid as compensation nearly £33,000 for glanders cases alone. South Africa has undoubtedly had its share. Rinderpest in 1896 swept through the greater part of South Africa; Transvaal farmers were taken unawares, and before effective preventive or remedial measures could be devised thousands of cattle died. But good came out of evil, for the method of preventive inoculation demonstrated to the farming community the value of scientific treatment.

Lung-sickness has also appeared from time to time in South Africa, but the disease I wish to allude to more particularly and to classify with the aforementioned diseases is that of East Coast fever.

East Coast fever invaded the Transvaal in 1902. It has since proved itself to be a slow disease in the nature of its spreading—truly slow but sure. It reminds one of the after-effects of a fire—the fire having been extinguished to all appearances, but the gentle waft of wind starts it again. However, it is not on the disease East Coast fever I desire to write upon, as many excellent treatises by the Veterinary Department have been written and issued. I more particularly wish to outline the administrative work adopted for its eradication in Zoutpansberg. No one who has lived in this district will deny that in or about the year 1904 the whole district, as far as the disease was concerned, was in a state of chaos—nobody knowing where it actually existed or where it was likely to appear next. The disease appeared in Zoutpansberg in 1903, and as no restrictions were placed on the movement of cattle it naturally spread throughout the district with great rapidity, and has been responsible for the deaths of thousands of cattle since that time. At that period stockowners became somewhat discouraged—public meetings being held throughout the district, and at each meeting interested owners wished to know what was to be done. It was eventually decided that movements of cattle be curtailed, and then only were such movements to be allowed under permit. An advisory

board of stockowners was formed to determine each and every movement in conjunction with the Government Veterinary Surgeon and Resident Magistrate before issuing the permit. This gave the officials an opportunity of tracing the disease and locating it with considerable certainty. The Government then decided to fence in such areas or farms as were known to be infected. With reference to the system of fencing I extract an excerpt from the Principal Veterinary Surgeon's Annual Report (1906) to the Director of Agriculture: "The policy outlined in my last annual report for dealing with this disease has been strictly adhered to and diminution in the number of fresh outbreaks, and the removal of quarantine from numerous areas which were formally infected, many of which have since been successfully restocked with cattle, may be pointed to as evidence of the success which has attended our efforts to beat back the disease. Considerable opposition was shown by a certain section of the public to the compulsory fencing of infected and suspected farms and locations at the expense of the owners, where this was considered necessary to stay the progress of the disease, but when it became generally known that the first payments for the enclosure of such areas did not fall due till after the lapse of two years from the completion of the fence, by which time the farm was often free from disease and ready for restocking, that the payments were extended over a period of eight years, and that the fence when erected was sufficient and might be regarded as a permanent improvement to the property, the objection to Government-erected fences died out to a great extent, and now the number of applications for the enclosures of farms under the East Coast Fever Ordinance, lodged voluntarily by owners of farms within infected areas, is increasing daily. Apart from the benefit to be derived from fencing, so far as East Coast fever is concerned, the erection of these fences must of necessity serve as a means of checking the spread of numerous other contagious diseases, such as scab and lung-sickness."

Happily, little or no opposition was shown to any fencing done by the Government under the East Coast Fever Ordinance in Zoutpansberg. The foregoing policy was continued and appeared to be successful, as signs of the disease abating were markedly noticeable, but stockowners felt that there was no real finality—outbreaks still occurring. Public meetings were again held in 1908 to discuss the position, and it was then resolved by the majority to approch the Government to introduce the method of extinction by slaughter with compensation—this method being adopted in February of 1909 and carried on until June of the present year, with the exception of one or two isolated cases later. On a farm becoming infected, and as soon as the disease was confirmed by bacteriological examination of the blood of the sick animal, steps were taken for the slaughter of the remaining cattle and the immediate fencing in of the infected farm, and reasoning from the life history that a tick's existence is under fourteen months, a period of fifteen months is allowed to elapse before such area or farm may be restocked. This has proved the safer and more economical method of dealing with the disease in the long-run, as several farms cleared of cattle by slaughter, which were at one time badly infected, have been restocked at the end of fifteen months with safety. The adjoining and contiguous

farms to an infected farm were placed under special police supervision, the animals counted twice a month, and a statistical register of such census of cattle kept. This was found especially necessary where natives were concerned who invariably failed to report sickness. From the local reports from time to time on the pest, it appeared to all that headway was being made and that the picture was assuming a different appearance. In the *Zoutpansberg Review* of the 20th January, 1911, an extract embodied in a report by the Government Veterinary Surgeon to the Resident Magistrate bearing on stock diseases in the district, and more particularly with respect to East Coast fever, was published: "East Coast fever has for the past eight years been the stumbling-block towards improvement, but I am pleased to state that the present method adopted dealing with this disease, although perhaps drastic, is gradually and assuredly having a telling effect for the benefit of the community in general and the stockowners in particular. There have been 148 farms released from quarantine during the past year, leaving some sixty-nine farms under police supervision. The position on the whole, however, is indeed satisfactory and hopeful. If prompt measures are taken on the first confirmation of the disease, and the farm immediately fenced, it is seldom that any further spread takes place. The greatest difficulty presents itself in dealing with the disease in isolated native territory, where failure to report the existence of the disease is often misleading as to the extent of the infected area, and an incalculable amount of harm is done. The disease is still active in Sibasa area, but steps have been taken to concentrate all the cattle in various camps under special white police, and all cattle have been moved twenty-five miles inwards from the Rhodesian border. (To-day, the Sibasa area we believe to be clean.) Fifty per cent. of the occupied farms once badly infected are slowly and gradually being restocked. If the present policy is kept up it should eventually end in the ultimate eradication of this pest."

Abundant evidence is afforded of the truth of the Veterinary Surgeon's report, as to-day in the Woodbush Ward in which I live all farms have been declared free and removed from quarantine, and I am also informed that there are throughout the whole district only some forty-five farms in quarantine at present, the greater number of which will also be out in a short space of time—a truly altered spectacle to when the disease assumed its maximum height three years ago when some 450 farms were in quarantine. In general, and lastly, it must be gratefully acknowledged that much of the work accomplished in the past and the new facilities for present and future work is due to the recognition of the Transvaal Government, and notably General Botha and the Department of Agriculture, of which he is the head, of the economic value of veterinary science.

DIPPING.

The Dipping Tanks (Advances) Act of 1911, which was passed at the last sitting of the Union Parliament, is already having a good effect in this district—many farmers taking advantage of the provisions thereof, i.e. to obtain help from the Government to construct dipping tanks on their farms. Many people are now becoming firm believers in dipping of their stock, whether disease is in their

midst or not. The very fact that this feeling is abroad is a great tribute to the influence of the Veterinary Department. This gospel the Department has been preaching ever since Natal experiments have shown conclusively that East Coast fever can be checked and stamped out by dipping. But for this to be thoroughly and successfully carried to its end I can only endorse what General Botha has so often repeated, that it is very desirable that the whole-hearted support of the entire population be with us, because without such support the eradication of disease is undoubtedly more difficult. We must have the sympathy and co-operation of the farming community to successfully combat this and other dreaded diseases. That this sympathy and better understanding is gradually being won to the Government in northern Transvaal is now becoming apparent. The exactness of veterinary science is having its effect on the people. Our only little difficulty now is the combating of the professional agitator, who by persistently distorting facts keeps the more remote, most ignorant, of our farmers worked up to a continual state of agitation against the Veterinary Department and General Botha. As an instance of this distortion I may mention that a farmer came to me and reported that as a result of General Botha's dipping scheme, he and seven other farmers, living in a block, and owning seventy head of cattle between them, would have to sell out and go to German East Africa. He had been informed by a prominent man that each and every owner of horned cattle would be forced by the dipping law to build a large concrete tank costing at least £200 on his farm. When I pointed out to him that the dipping regulations could be freely conformed to by the erection or construction of a central tank, costing in that particular instance £20, he appeared surprised and relieved.

GENERAL.

Early in 1909 there were in District Zoutpansberg 300 farms actively infected with East Coast fever; compulsory slaughter was then introduced and the number at end of year stood at sixty-three.

For certain good reasons compulsory slaughter was discontinued (except in certain extreme cases) this year, and at present date there are forty-five farms in quarantine. Of these only eleven are actively infected with the disease to-day. The estimate for the ensuing six months shows twenty-six farms as likely to be freed from quarantine. Thus it would appear that the end is in sight, and for this favourable outlook we must thank those who so freely gave their services to the Pietersburg Advisory Board, official and private. The actual daily brunt of the work has, however, fallen to Resident Magistrate Wheelwright, C.M.G., and District Veterinary Surgeon J. I. Edgar. Both these officials may feel assured that the difficulties of their position have been fully realized, and that their firm yet tactful handling of a critical situation has gained them the confidence of the progressive people in the north, both British and Dutch. There is a strong feeling that having managed affairs so ably till now, there should be no interference with the policy of these officials; it should be left entirely to them to bring their long-fought campaign to a completely successful issue.

Actinomycosis Bovis (Lumpy Jaw) in Natal.

By Jas. L. Webb, F.R.C.V.S., Government Veterinary Surgeon, Mooi River, Natal.

On certain farms in the midlands of Natal this disease is becoming far too prevalent, particularly amongst the pure-bred and graded Devon cattle. The first cases brought to my notice in Natal were some twelve years ago, and my impression is that the disease was firstly introduced by bulls imported by breeders of Devon cattle; these animals infected the farms and the disease subsequently spread from these centres.

Although actinomycosis is a disease which can affect animals other than bovines, including human beings, it is very rarely met with except in cattle; common names are given to the disease according to the part implicated. When the site of infection is the jaw, the name "lumpy jaw" is given to it; when the tongue, "wooden tongue", and if the soft part of the throat, "wens". Although the parts mentioned are the commonest sites of the disease, it is occasionally met with in other regions, such as the oesophagus, larynx, liver, lungs, mammary gland, and, in the latter, it may be mistaken for tuberculosis until differentiated by microscopical examination. In this country I have never seen any parts other than the jaw-bone affected.

Before the real cause of the disease was discovered by Bollinger in 1877, it was believed to be of a cancerous nature, but it is now known that the lesions are the direct result of infection with vegetable parasites called "actinomyses" or "ray fungi"; these organisms can exist both within and without the animal body. Outside the animal body it grows on certain grasses, barley, etc., and this is the source of infection. The disease does not appear to be infectious directly from one animal to another, but diseased animals undoubtedly contaminate the veld over which they graze.

The fungus gains access to the tissues through abrasion of the skin or mucous membranes. The reason the jaw-bones are so often the site of the disease is because the fungus taken in with the food comes into contact with abrasions of the gums which occur during the shedding of the teeth. Once the disease becomes established, it continues to spread, breaking down the tissues and rarefying the bone; the jaw-bones become increased in volume, and, eventually, soft points can be felt which break and discharge a characteristic pus containing small irregular yellow granules which are colonies of actinomyces. The sinuses sometimes heal, but only to break out again in another place; often a large area of bone and skin breaks down exposing a mass of unhealthy granulating tissue (proud flesh) which bleeds at the least touch.

When the tongue is the seat of the disease it increases in size, becomes very hard with ulcers on its surface; the result is that feeding becomes a matter of difficulty, the animal salivates considerably, and the tongue cannot be completely withdrawn into the mouth.

Treatment.—When the disease is confined to the soft tissue such as the tongue, the internal administration of iodide of potassium acts as a specific given in from ¼ to 2 dram doses daily, dissolved in a bottle of cold water. The treatment should be continued for from two to four weeks. As, however, relapse may occur after apparent recovery, it is advisable to fatten and dispose of the animal for slaughter. But when the jaw-bones are affected, surgical treatment is usually required as well; in advanced cases such as those shown in the illustrations, treatment is not advisable, as the parts can never regain the normal, and even if the germs are destroyed the animals are never likely to do well because of the displacement of the molar teeth which is almost sure to have taken place.

In the cases of the jaw-bone disease where exuberant granulations exist, I find the best treatment is to remove them with a hot iron and afterwards dress with biniodide of mercury ointment. Sinuses should be syringed daily with a strong solution of this drug. If the disease is noticed immediately the bone begins to enlarge it can sometimes be stopped by rubbing the swelling with an ointment of biniodide of mercury 1 to 8, and to keep up the action of the drug, smear the part with the ointment every few days and give iodide of potassium or biniodide of mercury internally.

As actinomycosis occurs in man it is advisable that care should be taken when handling and dressing patients.

Bee-Keeping in South Africa.

By LOUIS L. W. HARDWICK, Hon. Expert, South African Bee-keepers' Association.

APICULTURE has made rapid progress in South Africa during the last few years. No one can deny this. This result is mainly due to the dissemination of knowledge of modern bee-keeping, and also in no small way to the daily Press, where prominence has been given to the subject from time to time. The work done has, however, been merely of a rudimentary nature, and has only shown what a tremendous amount has yet been untouched and what has yet to be accomplished before we can boast of anything like perfection. One of the principal changes which has been made is the dethronement of the king paraffin box, tin, bucket, etc. The advantages to be derived from the use of modern hives and appliances are legion, and in this paper it is not possible to deal with them. I cannot, however, allow this opportunity to pass without giving one reason, which is the reason why anything but movable frame hives should be entirely abolished.

A short while ago a disease broke out in an apiary in the Transvaal. The colonies affected were inspected by experts, with the result that the hives, with their occupants, were destroyed. A slight difference of opinion exists as to whether the disease was that of *Bacillus alvoi*, commonly known as foul brood, but in any case it is a disease which, once getting a hold, will paralyse the bee industry unless stringent measures are adopted.

Under what more favourable circumstances can the germs have for multiplying than the colony from which the combs cannot be taken out and systematically examined?

The person who keeps bees in this old-fashioned way, moreover, possesses little knowledge of bee-keeping beyond that they have a sting which makes things hum generally. The bees are left to work out their own salvation, and the only time they are visited is when honey is coming in. The keeper of bees, with a smoking rag in one hand and a carving knife in the other, and the boy in the rear with a bucket, goes to the hive and the combs are cut out without any reference as to whether the honey is ripe or whether the combs contain brood. Beyond this the bees are not looked at. Let us then picture the result when disease comes along.

The colony is attacked; nothing out of the way is noticed until the bees have died out. This is not the end of the trouble, but the beginning, for the germs of disease—if foul brood—will develop into the spo e stage, where they will remain dormant, retaining their vitality for any length of time, only waiting to come into contact with nourishing material.

This is done in the following way:—Any honey remaining in the diseased hive will very quickly be discovered by the bees from other hives, robbed out, thus spreading the disease with incredible rapidity.

By these remarks it will be seen that, apart from all the advantages to be derived from modern methods, including the increasing of the yield of honey per colony, it is very necessary that the hives in which the combs are fixed should be done away with. The Government, I understand, are giving the matter consideration, but nothing tangible can be accomplished without the co-operation of bee-keepers. This brings me to the next point.

I have for some considerable time past been anxious that Capetown should have a bee-keepers' association. All my efforts in this direction have proved fruitless until quite recently, when all interested in bee-keeping were invited to my apiary where the modern appliances were exhibited. The attendance was excellent, and the enthusiasm displayed quite took me by surprise. At the close of the afternoon's proceedings it was proposed, seconded, and unanimously carried that a meeting of bee-keepers and all interested be called in Capetown as early as possible with a view to starting an association. Judging by the letters I have received since this field meeting enthusiasm is still running high, and arrangements are now well in hand to hold the public meeting early in November, when it is hoped a very large and influential gathering will be present.

Union is strength, and in order to obtain the fullest possible advantages it is very expedient that the new association should affiliate to the South African Bee-keepers' Association, whose headquarters are at Johannesburg. Those interested in bee-keeping will learn with pleasure that the South African Bee-keepers' Association has now ventured so far as to produce its own journal; the first issue is to appear in November. Being entirely South African it will appeal to the South African bee-keeper, and will certainly be a valuable lever to further on modern apiculture. A copy of the first issue will be forwarded free to any interested bee-keeper upon application to the Secretary, South African Bee-keepers' Association, P.O. Box 3653, Johannesburg, or to myself.

Before closing I would like to mention another matter, regarding the sale of honey. The Hon. F. S. Malan, speaking at a meeting of the Uitenhage and Port Elizabeth Farmers' Association held at Port Elizabeth in February, 1909, is reported to have said:—"He had lately been considerably troubled by the question of distribution. When honey, which on the Port Elizabeth market realized 3d. was selling for 1s. 3d. at Capetown and 1s. 6d. at Johannesburg, there was something radically wrong. He did not know exactly where the fault lay, but if they produced an article for which they could only find an uncertain market then they should try and produce for their own use." The fault is not far to seek, for we have only to cite the case I mentioned in an earlier part of this paper. What bee-keeper, working on modern lines, could retail his honey at 3d. per lb.? None. The honey sold at this price is a conglomeration of comb, brood, propolis, and dead bees; and although this can be strained, the juices of the brood, with the formic acid from the sting of the bee, has quite destroyed the flavour, making the stuff dear at 3d. per lb.

Honey should only be put up for sale in jars (1-lb. size for preference), neatly labelled, showing the name of the producer and his address. Sections should be glazed, that is have a piece of glass fastened to each side by means of an overlapping piece of lace paper, the label bearing the exact net weight to be fastened on the top.

I have seen sections in shop windows dripping with honey without any protection from the myriads of insects attracted by the sweet honey. I need not say more to advocate the sealing up of sections to protect them from these insects.

Honey is regarded by many people as a luxury to be brought out on "state" occasions, or put away safely to be used in the winter as a cure for colds, sore throats, etc. At this rate of consumption and the increase in production consequent upon the number commencing bee-keeping from year to year will result in honey being sold at a price unremunerative to the producer. By this I do not mean that honey should be sold at a price which debars the ordinary working family from using it. I am confident that the use of honey could be very much augmented by having it put up for sale in a clean and attractive manner. and last, but not least, have a large exhibit of honey at the various agricultural shows, the section to be attended by a bee-keeper who could explain honey, its production, uses, etc.

The Western Province Agricultural Society has promised to alter very materially the existing conditions at the next Rosebank Show, and I am hopeful of being able to stage a record number of exhibits. If the reader is a bee-keeper will he kindly make note of this?

Time and space does not permit me to deal with the value of honey for medicinal purposes, for this subject would be quite sufficient to fill a small book.

In writing this paper I have merely touched upon the fringe of the various matters, my object being to incite interest and to further on this important industry.

Pernicious Scale Notes.

The known outbreaks of this pest in and about Pretoria, away from the main one, now number about forty-five, and involve seventy-seven separate premises. The known country outbreaks, in addition to the one in Natal discussed below, now number eleven. They consist of three at Witbank, and one each at Bronkhorstspruit, Benoni, Standerton, Nylstroom, Premier Mine, Rayton, Bethal, and Boksburg. In many cases only a few trees are concerned; in others, several hundreds. The parent outbreak in Pretoria is by far the most serious.

Occurrence in Natal.

The only known South African occurrence of Pernicious Scale outside of the Transvaal is one that was on an isolated residential property at Richmond, Natal. This one came to light early in October. It appears to have started five years ago, but circumstances mitigated against its rapid extension and only half a dozen trees are known to have got infested. The infested trees were promptly destroyed, and since then the thirty-four deciduous fruit trees that remained on the place have, by arrangement, been uprooted and burned. By these steps it is thought that the outbreak has been entirely eradicated.

Much Needless Alarm.

Much unnecessary alarm has also been caused amongst fruit growers. Some Western Province farmers have even questioned the advisability of permitting the return of cases and baskets that have been to Johannesburg or other Transvaal markets lest infection be brought to their districts by them. There is no danger whatever that the pest will reach them through such means, even were it to become exceedingly common in the Transvaal, and it is doubtful if any infested fruit has yet reached a market. With trifling exceptions, the infested trees in orchards established for commercial purposes are only four years old at the most, and for the most part the occurrences of the pest are in town and suburban gardens. Mention was made in the September *Journal* (page 265) that no authentic case is known of the pest having become established from fruit, although for many years great quantities of infested Californian fruits were marketed in the eastern places. The east was clean in those days and finally became infested through the medium of nursery stock.

Easy to Combat.

Then many fruit growers appear to think that there is no remedy for the pest, and that their orchards are doomed if it spreads into them. As a matter of fact the pernicious scale is one of the

easiest of orchard pests to combat. The problem of holding it in check is simple in comparison with that of suppressing peach aphis, codling moth, fruit fly, or the scale pests of citrous trees. One, or at most two, thorough sprayings with a suitable wash when the leaves are off is all that is required to control it, while it is necessary to treat the trees over and over again, and just at the right times, to control the first three insects mentioned. What makes the scale more dangerous than the codling moth and fruit fly and many other orchard troubles is the fact that if it is neglected it tends to kill the trees, while they merely affect the crop of the season. It is not commercial orchards that are most menaced by the pernicious scale; it is town and village gardens and small farm orchards on which for various reasons proper spraying of trees for scale is well-nigh impracticable.

Vineyards not Menaced.

A fear that vineyards are menaced by the Pernicious Scale has taken strong hold in the Western Province, and this opportunity is taken to assure vine growers that there is not the slightest danger of vineyards becoming materially affected. The scale can exist on vines, and it has been found in small numbers on vines in several gardens in and near Pretoria; but while this condition of affairs would make it necessary to destroy all vines near infested trees in order to eradicate the pest completely, it does not signify that the pest would ever become so abundant in a vineyard as to do serious damage. An occasional practically unpruned vine growing near an infested tree might be considerably harmed, but not vines in general. The red scale, soft scale, oleander scale, and greedy scale all attack vines quite as freely as the pernicious scale. They are well-known pests throughout South Africa and are common on vines in town gardens; but what vine grower fears them or ever considers it advisable to spray vines to suppress them?

Transvaal Horticulturist's Experience.

Mr. R. A. Davis, the Transvaal Horticulturist, who has recently returned from a visit to the United States America, fears that the wild stories now being circulated about the pernicious scale may have a prejudicial effect on the planting of fruit trees. The establishment of the insect in the country should encourage the man who is prepared to give proper attention to his work to plant the kinds of fruit trees that are most attacked rather than to discourage him from planting them. He should plant to offset the trees which the amateur replaces with plants of kinds that he can grow with less trouble. As illustrative of the ease with which the scale may be suppressed, Mr. Davis gave his own experience in a memorandum which he recently wrote for the Department. He states that, in 1889, when he was farming a few miles north of San Jose in California, the scale appeared in orchards round about and threatened their existence. The alarmed growers discussed the position and resolved to tackle the pest energetically. This they did with lime-sulphur-salt wash as soon as the trees become dormant, and so well was the spraying done that no recurrence of trouble has

been experienced in the twenty years since. Spraying with a suitable wash as a precaution against this and other orchard troubles has become a recognized winter practice in the locality and is often carried out when no sign of insect pest or plant disease is observed. The Californian growers of the time Mr. Davis writes were at a disadvantage compared with growers now. About twenty years afterwards, experiments conducted by the Cape Colony Entomological Service demonstrated for the first time that clear lime-sulphur solution gave as good results against scale insects as the much more costly and troublesome lime-sulphur-salt wash. American investigators quickly confirmed the result, and now lime-sulphur is the most popular of all sprays for scale on deciduous trees. Enormous quantities of this solution in a concentrated condition are now prepared in factories and sold to fruit growers ready for diluting with cold water, and such proprietary preparations have found their way to South Africa. In recent years factory-made "miscible oils" have gained great distinction as pernicious scale destroyers, and now sharply compete with lime-sulphur. One of the best of these products, "Scalecide", has already established an excellent reputation in South Africa. Altogether, the South African who wants a spray that will kill pernicious scale does not have to go to much trouble to get one.

Town Difficulties.

It is relatively difficult for the small owner to combat the Pernicious Scale efficiently, because a proper spraying outfit and spraying materials may cost him out of all proportion to the profit he derives from his few trees, because his time is chiefly given to duties away from his garden, and because, more often than otherwise, the trees of kinds that get infested are interplanted with citrous and other evergreen sorts and with vegetables and tender plants that are likely to be severely damaged by the strong washes which it is necessary to use. Mr. Davis touches on these difficulties in the memorandum referred to above. He says: "As is well known, most owners of erven are so anxious to get together nice collections of fruit or ornamental trees, roses, or flowers, that in nearly all cases gardens contain half as much again as they should, trees are crowded together, and planted without any regard to treatment in case of disease. In instances, mealie and other crops are grown between the trees, rendering it impossible to spray whilst the crops are standing, and, finally, scores of gardens contain trees planted with an entire lack of judgment at distances of from 6 to 10 feet apart, which have never been pruned, and, as a consequence, have branches interlaced rendering spraying at any time impossible. It is in such jungles that the insect breeds freely, and their removal would seem not only beneficial to the country at large, but also to the owners themselves, for the ground then could be properly planted with decent fruit or other trees which, with reasonable care, would become a source of pride as well as profit.

Slowness of Spread.

If only the pest is kept out of the nurseries, its spread over the country is sure to be slow, even should nothing be done towards

suppressing it on private premises. South Africa has an advantage in the wide stretches of bare veld between its settlements and the considerable degree of isolation of orchard from orchard that exists even in the principal fruit-growing parts. The State of Victoria, a much more closely settled country than South Africa, and where fruit growing is of much greater importance, has had the pest twelve years at least, and probably much longer, but it is yet far from being all over the State, and it has been kept out of the nurseries. The longer the scale is in a country the less virulent as a pest it appears to become, probably because more and more predaceous and parasitic insects learn to attack it. The scale appears to be no trouble at all in China, its supposed native home, and it has long since ceased to be regarded with dread in California, where it arrived thirty-five to forty years ago. The eastern United States have had it about twenty years, and now its virulence there seems to be on the wane. Hence, if it is prevented from spreading rapidly in South Africa, the burden of its presence may never prove a heavy one considering the country as a whole, and by strict attention to nurseries there is no doubt that the spread may be greatly retarded.

Outbreaks of Animal Diseases.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF OCTOBER IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

Province and District.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
I.—CAPE PROVINCE—																
Albany	.	.	.	.	.	.	.	.	.	In the Cape Province, Scab is dealt with by the Sheep Inspector's Department.	.	.	.	.	.	2
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Barkly West	.	.	2	.	.	.	.	.	.		.	.	.	.	.	.
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East London	.	.	1	.	.	.	.	.	.		.	.	.	.	.	.
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Stockenstroom	.	.	.	1	.	.	.	.	.		.	.	.	.	.	.
Native Territories:—																
Tembuland—																
Umtata	.	3	.	.	.	.	.	.	.		.	.	.	.	.	.
Engcobo	.	.	.	.	1	.	.	.	.		.	.	.	.	.	.
Mqanduli	.	3	.	.	.	.	.	.	.		.	.	.	.	.	.
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Port St. Johns	.	4	.	.	.	.	.	.	.		.	.	.	.	.	.
Pondoland—																
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Province and District.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
I.—CAPE PROVINCE (*continued*)—																
Native Territories:—																
East Griqualand—																
Mount Ayliff	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Umzimkulu	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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Mount Fletcher	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
II.—NATAL—																
Newcastle	.	.	.	.	.	.	.	.	.	11	.	.	2	.	.	.
Dundee and Umsinga	.	.	.	.	.	.	.	.	.	20	.	.	7	.	.	.
Klip River	.	1	.	.	.	.	.	.	.	10	.	.	.	.	.	.
Bergville	.	2	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Estcourt	.	3	.	.	.	.	.	.	.	8	.	.	.	.	.	.
Weenen	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Umvoti	.	.	.	.	.	.	.	.	.	13	.	.	.	.	.	.
Lower Tugela	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.
Lion's River	.	.	2	.	.	.	.	.	.	1	.	.	.	.	.	.
Pietermaritzburg and Umgeni	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Impendhle	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Ipolela	.	2	.	.	.	.	.	.	.	3	.	.	.	1	.	.
Richmond	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Ixopo	.	2	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Alfred	.	9	.	.	.	.	.	.	.	1	.	.	.	2	.	.
Lower Umzimkulu	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Alexandra	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vryheid	.	.	.	.	.	.	.	.	.	28	.	.	8	.	.	.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF OCTOBER IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

Province and District.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
II.—NATAL (*continued*)—																
Utrecht	.	2	.	.	.	.	.	.	.	8	.	.	.	.	.	.
Paulpietersburg	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Zululand	.	.	.	.	.	.	.	.	.	17	.	.	7	.	.	.
III.—TRANSVAAL—																
Barberton	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Bethal	.	.	.	.	.	.	.	.	.	25	.	.	.	.	.	.
Bloemhof	.	.	.	.	.	.	.	.	.	20	.	.	.	.	.	.
Carolina	.	1	.	.	.	.	.	.	.	26	.	.	.	.	.	.
Ermelo	.	.	.	.	.	.	.	.	.	48	.	.	.	.	.	.
Heidelberg	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.
Krugersdorp	.	.	.	1	.	.	.	1	.	2	.	.	1	.	.	.
Lichtenburg	.	.	.	.	.	.	.	.	.	13	.	.	.	.	.	.
Lydenburg	.	.	.	.	.	.	.	.	.	39	.	.	.	.	.	.
Middelburg	.	.	.	.	.	.	.	.	.	9	.	.	.	.	.	.
Piet Retief	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Potchefstroom	.	.	.	.	.	.	.	.	.	16	.	.	.	.	.	.
Pretoria	.	.	.	.	.	.	.	1	.	28	.	.	.	.	.	.
Rustenburg	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	.
Standerton	.	.	.	.	.	.	.	.	.	35	.	.	.	.	.	.
Wakkerstroom	.	.	.	.	.	.	.	.	.	15	.	.	.	.	.	.
Waterberg	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Wolmaransstad	.	.	.	.	.	.	.	.	.	23	.	.	.	.	.	.
Witwatersrand	.	.	2	6	.	.	.	.	.	1	.	.	3	.	.	.
Zoutpansberg	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.

RETURN OF OUTBREAKS OF ANIMAL DISEASES REPORTED DURING THE MONTH OF OCTOBER IN THE CAPE PROVINCE, NATAL, TRANSVAAL, AND ORANGE FREE STATE.

Province and District.	Scabies (Equine).	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Rinderpest.	Pleuro-Pneumonia.	Tuberculosis.	Foot-and-Mouth Disease.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Epizootic Lymphangitis.	Sheep-pox.	Sponsziekte.
IV.—ORANGE FREE STATE—																
Bethlehem	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.
Bethulie	.	.	.	.	.	.	.	.	.	.*	.	.	.	.	.	.
Bloemfontein and Brandfort	.	.	.	1	.	.	.	.	.	10	.	.	.	.	.	.
Boshof	.	.	.	.	.	.	.	.	.	23	.	.	.	.	.	.
Edenburg	.	.	.	.	.	.	.	.	.	9	.	.	.	.	.	.
Fauresmith	.	.	.	.	.	.	.	.	.	29	.	.	.	.	.	.
Ficksburg	.	.	.	.	.	.	.	.	.	.†	.	.	.	.	.	.
Frankfort	.	.	.	3	.	.	.	.	.	1†	.	.	.	.	.	.
Harrismith	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Heilbron	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.
Hoopstad	.	.	.	.	.	.	.	.	.	11	.	.	.	.	.	.
Jacobsdal	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Kroonstad	.	.	1	.	.	.	.	.	.	7	.	.	.	.	.	.
Ladybrand	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Lindley	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.
Philippolis	.	.	.	.	.	.	.	.	.	12	.	.	.	.	.	.
Rouxville	.	.	.	.	.	.	.	.	.	25	.	.	.	.	.	.
Senekal	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
Smithfield	.	.	.	.	.	.	.	.	.	22	.	.	.	.	.	.
Thaba 'Nchu	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.
Vrede	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.
Vredefort	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.
Wepener	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
Winburg	.	.	.	.	.	.	.	.	.	21	.	.	.	.	.	.
Trompsburg	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	.

* Inspector deceased. † Incomplete.

Milk Records.

ELSENBURG COLLEGE HERD.—OCTOBER, 1911.

Breed and Name of Cow.	Days in Milk.	Yield in Lb. During October.	Yield in Lb. Total to Date.	Yield in Lb. Daily Average.
FRIESLANDS.				
Rose	410	428	9952	24·2
Bell	339	337	7013	20·6
Veronica	316	496	5778	18·2
Cato	248	260	2248	9·0
Victoria	220	657	5311	24·1
Anna	206	357	2291	11·1
Christina 58	206	485	3344	16·2
Daisy	168	767	4348	25·8
Violet	157	785	4605	29·3
Beauty	155	1376	6436	41·5
Vera	155	989	5099	32·9
Belladonna	117	928	3910	33·4
Romula	45	1028	1498	33·3
Christina 54	36	767	896	24·8
Ant	8	174	174	21·7
JERSEYS.				
Gwendolen	199	617	3670	18·4
Gertie	199	517	4108	20·6
Grace	182	595	3316	18·2
Gus...	174	550	2964	17·0
Gladys	173	647	3445	19·9
Gilliflower...	153	275	1807	11·8
Fanny	139	696	3080	22·1
Gipsy	113	646	2784	24·6
Evelyn	112	462	1665	14·8
Nellie	74	806	2019	27·2
Glee	61	1003	1997	32·7
AYRSHIRES.				
Lobelia	184	584	3833	20·8
Queen Dot...	32	1302	1340	41·8
CROSS.				
Bessie	112	1226	4861	43·4

The following are the average percentages of butter fat :—

Frieslands	=	3·30 per cent.
Jerseys	=	4·81 „
Ayrshires	=	3·95 „

Results of Egg-Laying Competitions.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

Fourth Egg-Laying Competition.—16th May, 1911, to 15th May, 1912.

Record for October, 1911, and Totals to End of October.

Pen Number.	Owner.	Breed. (Six Birds to a Pen.)	Record for Month. Eggs.	Record for Month. Weight. oz.	Record for Month. Weight. dwts.	Total to Date. Eggs.	Total to Date. Weight. oz.	Total to Date. Weight. dwts.	Position to Date.
1	F. W. Nicholson..	Buff Orpingtons..............	77	164	1	237	500	—	24th
2	F. T. Hobbs	Silver Wyandottes............	98	198	14	272	532	4	23rd
3	A. Riley..........	Black Minorcas (R.C.)..........	78	156	14	192	375	14	26th
4	N. Cole	White Leghorns (Amer.)	115	223	15	399	773	6	10th
5	S. T. Jones	White Leghorns (Amer.)	97	210	6	339	725	14	15th
6	H. Curtis..	White Leghorns (Amer.)	96	202	6	412	858	10	5th
7	S. C. Skaife......	White Wyandottes............	76	136	11	300	538	8	22nd
8	A. Keppie.......	White Wyandottes............	92	177	3	342	634	6	20th
9	S. A. West.......	White Leghorns (Amer.-Danish)	83	181	8	337	730	7	14th
10	H. H. Bright.....	Black Leghorns	114	225	9	460	914	8	3rd
11	B. Kauffmann ...	Brown Leghorns	102	208	8	394	821	3	9th
12	B. Kauffmann ...	Black Leghorns	100	217	2	326	702	4	18th
13	C. W. Pilkington .	Rhode Island Reds	76	167	14	223	495	1	25th
14	W. P. Cowan	White Leghorns (Eng.).........	118	239	14	463	890	11	4th
15	A. J. Stacy......	White Leghorns (Aust.-Amer.) (Re-entered from last competition for second year test.)	108	225	12	440	933	13	2nd
16	B. Kauffmann ...	White Leghorns (Eng.-Amer.)..	86	179	14	364	742	—	13th
17	S. Smith	Brown Leghorns	82	168	4	345	705	15	17th
18	Mrs. H. H. Bright	White Leghorns (Aust.)........	110	206	10	436	821	9	8th
19	N. Cole	Brown Leghorns	101	207	6	398	835	15	7th
20	F. Molteno	White Leghorns (Amer.)	88	165	13	387	714	10	16th
21	C. H. van Breda..	White Leghorns (Aust.)	119	232	14	498	972	13	1st
22	Mrs. C. H. van Breda	White Leghorns (Amer.).......	96	184	7	393	763	14	11th
23	S. A. West.......	Brown Leghorns	83	153	4	396	749	—	12th
24	Graham, Hope & Co.	White Wyandottes	111	220	4	348	691	1	19th
25	R. V. R. Jones ...	White Leghorns (Amer.-Aust.) .	118	229	4	297	576	12	21st
26	S. Smith	White Leghorns (Dan. & Amer.)	117	226	4	448	850	12	6th

Replacements (Scores Deducted from Pen Totals).

Pen 3.—No. 17 died. Replaced 23rd October. Score, 68 eggs; weight, 123 ozs. 5 drams.
Pen 5.—No. 28 died. Replaced 26th October. Score, 39 eggs; weight, 80 ozs. 14 drams.
Pen 12.—No. 67 died. Replaced 28th September. Score, 38 eggs; weight, 78 ozs. 4 drams.
Pen 16.—No. 96 died. Replaced 23rd October. Score, 71 eggs; weight, 160 ozs. 1 dram.
Pen 19.—No. 112 died. Replaced 27th August. Score, 35 eggs; weight, 74 ozs. 10 drams.

Manager's Report for October, 1911.

The total number of eggs for the month is 2560, 260 less than the yield for last month. There are several causes to account for this drop—in fact, I am surprised it is not a greater one, considering we have had frequent and sudden changes of the weather during the month; that twenty-nine birds have been broody, and that for several days, commencing on the 21st, there was quite an epidemic of crop binding, together with oak-leaf poisoning, followed by enteritis, to which I shall allude fully later on. The highest total of eggs in one day was 112, the lowest 63; the average daily yield for the month was just over 82, and the average per bird was between 16 and 17 eggs. The eight pens which have contributed the highest number of eggs are:—Pen 21, 119; pen 14, 118; pen 26, 117; pen 4, 115; pen 10, 114; pen 24, 111; pen 18, 110; and pen 15, 108. Four birds have

laid more than 24 eggs each, viz. No. 89 (she again heads the list, as she has done each month since the competition commenced) with 29 eggs. Nos. 19, 52, 56 each with 25; and Nos. 41, 139, 141, 144, and 153 have each laid 23.

The eight birds laying the greatest weight of eggs are :—No. 89, 62 oz. 1 dwt.; No. 52, 52 oz. 10 dwts.; No. 19, 49 oz. 5 dwts.; No. 141, 49 ozs. 4 dwts.; No. 51, 48 oz. 3 dwts.; No. 73, 47 oz. 13 dwts.; No. 56, 46 ozs. 12 dwts.; and No. 29, 46 ozs. 3 dwts.

The health of the birds, I regret to have to report, has been very unsatisfactory (the reverse of what it had been up to the present), and the mortality has been high, five deaths having occurred during the month, two from tuberculosis, two from oak-leaf (tannic acid) poisoning, and one (as an after result from this) from acute enteritis. Full reports of the course of the disease and post-mortem in each case have been compiled, but I shall deal shortly with them here. One case of tuberculosis was disease of the liver (going light), and ran the ordinary course of this complaint, viz. sluggishness, loss of appetite, shrunken comb, dull eye, and hollowing under each, loss of weight, and general wasting away; the post-mortem showed the usual enlarged liver, containing patches of tubercle, the kidneys and ovaries were also diseased, the latter extremely so, and instead of being similar in appearance, as they normally are, to a bunch of very small grapes, they presented one exactly like a mass of crushed strawberries and cream. The other case was a very exaggerated one of tubercular disease; its initial stages took the form of a tubercular cyst on the lower part of the back near the preen gland, this increased in size and finally extended between the pelvic bones to the interior of the abdomen, filling up, as the post-mortem showed, almost the whole of the lower third of it; then every organ except the heart rapidly became affected, tubercular abscesses forming in all. In the liver, which was much enlarged, there were twenty-three, varying in size from that of a millet seed to a hazel nut, the right lung was a mass (occupying half the chest cavity) of semi-purulent gelatinous matter; the left contained an abscess the size of a hazel nut. The direct cause of death was blood poisoning; it was the worst case of tuberculosis I have ever come across.

An epidemic of crop binding and oak-leaf poisoning was the cause of two deaths. On the 21st instant we experienced here a strong south-east wind amounting to a gale, which blew from the trees into the runs numbers of oak leaves with twigs attached, and the birds snapped these up as quickly as they fell (leaving their green food, rape and lucerne in favour of them) and swallowed them, with the stems and in some cases the twigs attached, causing crop binding. I washed out many, and opened one crop. Taken in moderation the tannic acid in these leaves may have no serious effect, but in a large quantity it would naturally have a toxic one, and the symptoms were exactly similar to those described by Dr. Robertson in his article on "Poisoning of Ostriches by Acorns", in the *Agricultural Journal* for August. Two birds succumbed on the 23rd instant, the direct cause being acute peritonitis with the inflammation and congestion of the intestines; all the other organs were normal. It is unfortunate for the pen (No. 16), of which one of these birds was a member, as it was third in position up to date, and she was one of the best of the six birds, which were all good layers. The other case succumbed after various ups and downs in her condition, on the 30th, and during her illness she had to be fed by hand on milk and egg beaten up. The direct cause of her death was blood poisoning, the inflammation and congestion of the peritoneum and intestines having been communicated to other abdominal organs; none of the heavy breed birds were affected, and at this I am not surprised, as I noticed that a few only partook of the leaves, and these very sparingly—the light active breeds being the offenders. This epidemic led to one of acute enteritis, four birds being affected, one dying after a few hours illness on the 30th; the post-mortem appearances were the same as in the other two, but in an aggravated form. The other three birds are holding their own, but are very ill and weak. It is most unfortunate that oak leaves taken in large quantities have this effect, and that the birds will eat them so voraciously, considering the large number of oak trees we have here. This I think bears out my theory, mentioned in a former report, that oak buds (which the birds also seem very partial to) have a deleterious effect, not sufficient to cause illness (the astringent qualities of the tannic acid in them probably not being so active as in the young leaves), but to cause a drop in the egg yield.

Broodiness has again been rather troublesome, twenty-nine birds having been affected with it, five of these being light-breed birds. This condition seems more common and certainly more persistent than in England, due there is no doubt to the warmer climate; therefore there is all the more reason, as I mentioned in my report for last month, why an endeavour should be made to breed it out.

The weather has been very changeable during the month, and the changes sudden, which is naturally detrimental to a good egg yield, but the majority of days have been warm and sunny; there were eight dull cloudy ones, and several evenings and nights were rather cold.

ARTHUR LITTLE,
Manager.

CEDARA.

RESULTS FOR MONTH OF OCTOBER.

(Competition commenced 9th July, 1911.)

NOTE.—Each Pen consists of four Pullets.

No. of Pen.	Owner.	Breed.	No. of Eggs.	Weight.		Total No. of Eggs.	Total Weight.		Position to date.
				lb.	oz.		lb.	oz.	
1	Mr. Greenough................	W.L.	54	6	6	155	19	5½	7th
2	Mr. Doidge..................	W.W.	39	4	14½	144	17	13	10th
3	Mr. Firmstone...............	B.O.	37	4	4	164	17	15	4th
4	Mr. Hutt....................	B.L.	39	4	3½	138	14	1	11th
5	Mr. Mason	W.L.	32	3	14½	113	12	3	15th
6	Mr. Chapman	B.O.	36	3	14	164	18	4½	3rd
7	Mr. McEwan..................	W.L.	25	2	14	96	11	10½	17th
8	Mr. Stranack................	W.W.	42	4	8½	156	17	14	5th
9	Mr. Dewar...................	S.W.	37	3	9½	151	15	1½	8th
10	Mr. J. J. Mann	W.L.	46	5	9½	150	18	8	9th
11	Mr. Coupland Ferguson.......	W.W.	34	3	13	156	17	7½	6th
12	Mr. Guy Blundell............	W.L.	53	6	13	169	22	0½	1st
13	Mr. Woodward................	W.L.	42	5	0	115	14	7½	14th
14	Mr. Wilson..................	B.O.	44	5	4	132	16	4	12th
15	Mr. Wilson..................	W.L.	35	4	8	90	11	7½	18th
16	Mr. Wilson..................	B.M.	42	5	7½	127	15	14	13th
17	Mr. J. J. Mann	W.W.	60	6	4	166	17	11½	2nd
18	Mr Hulett...................	W.L.	19	2	3½	101	12	1½	16th

EXPLANATION OF BREEDS:

W.L.—White Leghorns.
W.W.—White Wyandottes.
B.O.—Buff Orpingtons.
B.L.—Black Leghorns.
S.W.—Silver Wyandottes.
B.M.—Black Minorcas.

Correspondence.

This section will be set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture will be particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria", and written on one side of the paper only.

SALT AND LAMZIEKTE.

To the EDITOR of the *Agricultural Journal.*

SIR,—With reference to the above, my attention was drawn to a letter in the October issue of the *Journal* from the pen of "Self-Help Best Recommendation".

I fear this gentleman has been somewhat misled in believing that lamziekte in stock is caused by an excess of salt.

In nearly every country in the world salt is given to stock in some form or other, to nourish the blood, invigorate the system, and ward off disease. If salt is withheld from them, they will try to obtain it if only by chewing reims, rags, or bones. It is a natural craving which must be satisfied.

In this district, as well as in those adjoining, there are deposits of salt at least equal to those of Griqualand or Barkly West. On farms where it cannot readily be licked off the ground, there is the brack water (generally very brack, too) which cattle drink every day and thrive upon. Still many farmers consider it necessary to give their animals quantities of raw salt besides.

As lamziekte is rarely met with here in such conditions, it is obvious that the theory put forward by the old Griqua herd cannot be universally accepted as correct. Personally, I consider it nothing but a waste of time for a European farmer to approach these old native wiseacres, or ask advice on such subjects. That they know of many useful herbal remedies for various diseases cannot be denied; but they are not usually disposed to disclose the secrets of their ancestors for the edification and possible benefit of the white farmer. An old servant may show no objection whatever to being "drawn" by his baas. He may shake his head ever so wisely, and look whole encyclopaedias of knowledge, but he will allow nothing to escape his lips of any practical value to his questioner.

There are many stock diseases in this country for which European occupation is directly responsible. The white farmer was not satisfied with in-breeding. He wanted to improve his blood-strain, and in order to effect this, imported animals from all quarters of the globe. These animals often brought undesirable microbes with them, and as a result diseases broke out which no one knew anything about, and not even native sages could combat. Lamziekte may or may not have been one of these. The cause of it may continue to be a subject for controversy for many years to come. A definite solution will be arrived at some day, and then it may be found that it was the very simplicity of the thing which had for so long baffled scientific research.

It is a curious fact that down in this part of the country, lamziekte is associated almost exclusively with *sour veld* and *fresh water.*

There are instances where only a wire fence separates one farm—on which no cattle can survive the ravages of the disease—from another, on which a large number of animals thrive unaffected. And this has been going on for years—the only difference in the conditions on these farms being that one is all sour veld and the other sweet, or partially so, which seems to be sufficient to render stock grazing thereon immune. Were investigations pursued in this direction, important discoveries might result at a date perhaps not quite so distant. When the true cause of lamziekte is once proven, a satisfactory remedy and preventive will follow. Many have been suggested and many tried. One farmer I knew used to scour the country for miles around collecting bones. These he would give to his cattle whenever an outbreak occurred, and mortality would cease then and there.

This may also be worthy of investigation, but it was the possible *cause* of the disease, not remedies or preventives, which I intended to be the subject of this letter.

I was only anxious to exonerate salt—to make some effort to disprove a charge laid against one of the most indispensable and beneficent factors provided by Nature for the support of animal life.—Yours, etc.,

Petworth, District Alexandria, C.P., W. C. GOULD.
6th November, 1911.

To the EDITOR of the *Agricultural Journal.*

SIR,—"Self-Help Best Recommendation" writes in your October issue on the above subject, and I am inclined to think his theory will not do.

I have a location near me where I can safely say eighty to one hundred head of cattle died last year, and these Kaffirs give no salt nor have they any saltpan or brack ground of any description. Further, a farmer friend told me last week that he tried the same thing (i.e. giving no salt to his cattle). The result was, after one month's trial, he drove all his cattle to the Vryburg Stock Fair, with an additional loss of twenty head.

My contention is that lamziekte is more or less a very severe form of galziekte, as when I find my goats are being troubled with galziekte, I invariably have one of the cattle down with lamziekte; and since, as everybody knows, salt makes an animal drink well, and water assists the gall in its flowing, I personally cannot see why salt should be the cause of lamziekte. Of course, salt is no preventive for lamziekte, though, mixed with plenty of bonemeal, it is of great assistance in bringing cattle through when they do get lamziekte.

I have a heifer down now, which fell sick on the 29th ultimo—i.e. twelve days to-day that she has been down—and only started eating green barley yesterday. And yet she is going to pull through, and I am more than positive that had she had no bonemeal and salt, I should have had her hide only.

I might mention I do not wish to knock against "Self-Help", as it is quite possible the Hay District lamziekte is totally different to that of the "Kaap Plateau", where neither goats or cattle do well in comparison to sheep and donkeys.—Yours, etc.,

Vaalboschfontein, P. Bag, Taungs Station, C.P. E. A. PAPENDORF.
9th November, 1911.

To the EDITOR of the *Agricultural Journal.*

SIR,—Your correspondent from Hay in your October issue would oblige by something more definite on this matter. Does he mean that in Bechuanaland it is the practice to give quantities of salt to the cattle, or only let them have a salt lick with the bonemeal given? If the latter, then we should look for this complaint where cattle resort to saltpans for a lick. If quantities are given to the cattle, why is it done?

I have generally noticed that in the Transvaal salt is eagerly looked for by cattle, and it is by no means abundant. Then what relation is there between said saltpetre mines in the country and salt, if, as one presumes, the writer means common salt?

Years back, wandering in the Transvaal, I have seen the eagerness for salt by the cattle, which when the farmer at evening came out with a large pan of salt and shook it on the hill, would gather from around, all too eager for a lick of salt. But then there was no lamziekte, and it would be interesting to know what relation there is between salt and this stranger disease, and how the salt is given—supposed to increase it.

I would like to suggest that, where this disease is prevalent, farmers put in their bonemeal lick a few ounces of a soluble sulphur compound. This I have found very useful in man and animals—gently laxative—but its sulphur components appear to be very useful in digestive disturbances. It is quite safe. "Hyposulphate of soda", the same as used by photographers, is cheap and effective.—Yours, etc.,

Graaff-Reinet. W. ROE, SEN.

SALT AND GAL-LAMZIEKTE—ANOTHER VIEW.

To the EDITOR of the *Agricultural Journal.*

SIR,—In your last issue (No. 4, October, 1911) you are bringing under correspondence an article "Salt and Lamziekte—A Simple Raad", signed by "Self-Help Best Recommendation", which I read with great interest, as everybody nowadays seems to take a lively interest in this most important and destructive sickness.

Needless to say, I disagree altogether with your correspondent, and it gives me more than pleasure to disprove his statement.

I am living on a farm with two very extensive saltpans, and my cattle are eating salt in abundance—in fact, they are constantly in and around the pans, and are doing exceedingly well. So far I have lost no cattle from either gal- or lamziekte, although it appeared several times amongst them in some slight degree. Several of my neighbours are losing cattle, some more, some less, and as far as I know not one of them is giving salt. It seems to me so absurd to say that salt should have any detrimental influence on the bowels, as it is known to purify the blood and give both human beings and animals beneficial appetite, thereby causing that more than ordinary quantities of food and water are being taken, and thus improving the condition. Bad salt will naturally have detrimental effects.

I could not help ridiculing the yarn of the old Griqua, and were we to follow such advice, we might to-day just as well go in for velbroeken and velkombersen, for that is what they are still doing in the Langeberg. All these ancient customs have not proved themselves adaptable to our present century, and if your correspondent had to do to-day without salt, I should like to see how far he would come.

In fact, I have come to the conclusion that it is almost essential to dose the cattle from time to time, but not with epsom salts, but with ordinary cattle salt mixed with water.

How ridiculous to say "you white people brought it with your salt". Does your worthy correspondent not know that the best farmers all over the world are giving their cattle salt—in fact, no cowshed would be without salt, and why is there no gal- and lamziekte on the other continents if it is subsequent to the giving of salt?

I sincerely hope that "Self-H lp B st Recommendation" will give his advice a trial. His neighbours will sell slaughter stock, and he will look on, to mourn his further losses.—Yours, etc.,

Delarey, South-Western Transvaal, 29th October, 1911. PRO BONO PUBLICO.

SCAB AND ITS TREATMENT.

To the EDITOR of the *Agricultural Journal.*

SIR,—In your August number, I notice a letter—a very sensible letter too—on the above subject signed by Mr. R. Warren. In your October issue, I find two replies to same, signed by a Mr. Elliot and G. Ingram. It will be a waste of precious time to reply to Mr. Elliot's childish and insignificant remarks, as they betray very little experience on the subject. Mr. Ingram does not seem to have grasped Mr. Warren's contentions. He is evidently still fighting the living scab *acari*; whereas he would succeed much better if he were to apply his attention to their eggs or nits. I admit that the only disinfection for infected kraals and sheds is fire. But how many kraals and sheds are there not where it is absolutely impracticable to put fire to. And what about your infected veld if you don't use your stock as collectors of the scab insects and nits? Mr. Warren is certainly wrong if he is under the impression that the scab eggs will incubate in the dung of kraals. They require their natural host to incubate on, and as the vitality of these nits has baffled veterinary science, is it not a fact that they (nits) remain the main source of infection, and the only way to eradicate them now is to use your stock as collectors and drown them in your dipping tank. If you want to eradicate scab on your farm, it can only be done by systematical and continual dipping. Sir, allow me to give Mr. Ingram my experience. I always was and still am a red-hot supporter of a stringent Scab Act. When I moved on to the farm I am living on, now thirty-five years ago, it was a hotbed of scab, so much so that I felt inclined to give up farming. When the first Scab Act was proclaimed, I made up my mind to eradicate scab, and I can refer him to Mr. Davison and his books, that ever since the Act was first proclaimed I always had a clean bill; notwithstanding I have never burnt a kraal or shed, for the simple reason that it was impracticable to do so. My object was reached by what Mr. Warren advocates, using your stock as collectors of the scab insects or nits, and by dipping them every fortnight. It only took me three fortnightly consecutive dippings, and there was an outbreak three months later which I nipped in the bud before it had time to spread, and since then I have never had any trouble. I only used sulphuric dips, for the simple reason that, should there be nits, say four or five days old, the smell of the dips will still be so strong on the stock when they hatch out, that they will either die or leave their host and starve, for being once a living insect, they won't last long without a host. As far as I am aware there is no dip that will kill a nit, and I know from my own personal experience, that under favourable circumstances they will incubate after three years. Hence the necessity to fight the nits in the first place. As I have already stated, I am not against burning infected kraals where practicable as fire is a sure disinfectant. Thanking you in anticipation for space,—Yours, etc.,

Rietfontein, 4th November, 1911. E. A. PIETERSEN.

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DIPPING AND HAIRBALL.

To the EDITOR of the *Agricultural Journal*.

SIR,—In your last issue I notice one of your correspondents asking for advice *re* hairball in calves.

Up to a year ago we used to lose fully 60 per cent. of our calves through that cause until we put up a small concrete tank costing at the utmost £5, and dipped the calves regularly once a week, using full strength laboratory dip. Calves four days old went through the process. Since doing this we lose no calves whatever through that cause, and their condition generally has improved. Ringworm also was rife and likewise has disappeared.

The hairball is caused by the calves nibbling away at their hides in order to allay the irritation caused by the ticks and possibly other insects as well. In this manner the hair gets into their paunches, where it collects into balls.

I am sure this information will be of vast benefit to many of your readers if acted upon.—Yours, etc.,

Ndumu, Zululand, 5th November, 1911. L. C. VAN WISSEL.

SPECIFIC OPHTHALMIA.

To the EDITOR of the *Agricultural Journal*.

SIR,—The stock on this farm suffer a great deal from what I saw termed "Specific Ophthalmia", in the April issue of your *Journal* (page 457), the disease being much more severe among young stock and occurring less frequently during the cold months than when the weather is warmer.

On three different occasions I have found, on examining the eye of an animal thus affected, very thin white worms, from half an inch to about one and a half inches long. The worms were found under the lids and on the surface of the eye. On each occasion the eye was just in the first stages of the disease when the worms were found, and a few drops of bluestone solution rectified matters.

Could you tell me if this worm—no thicker than a human hair—is the cause of the disease? If not, what may we attribute these insects to?—Yours, etc.,

Prynnsberg, Clocolan, Orange Free State. J. ROBERTS.

[The Veterinary Division, to whom the above letter was referred, state that the worms in question are frequently found under the eyelids in animals in this country, and cause a mild ophthalmia. A dilute bluestone solution will get rid of the worms and heal the eye.—EDITOR, *Agricultural Journal*.]

TICK ERADICATION.

To the EDITOR of the *Agricultural Journal*.

SIR,—It is an interesting problem how to prevent the tick fever, and in consequence one has tried one remedy, and another, another. I think that the idea of Mr. Jan Roberts, Rhenosterfontein, District Rustenburg, is worthy to be made public. A week ago I was at his farm, and found his calves quite clean from ticks, although in the bushveld. He assured me that all his cattle are clean. His plan is as follows:—All the cattle are brought to the kraal every night; they are not let out too early the next morning. At the kraal he keeps a certain number of fowls, over a hundred, I estimated. It is the work of these fowls to keep the cattle free from the ticks. Some of the cattle are even so intelligent as to lie down so as to facilitate the work of the fowl.

It will be of some interest to learn whether other farmers have also tried this process, and with what result?

The matter is simply this: we must destroy the tick, and whether it is done by means of a fowl or otherwise does not matter, so long as it is done. The most economic way, therefore, is the one most to be recommended.—Yours, etc.,

Pretoria. GID. F. JOUBERT.

THE SECRETARY BIRD.

To the EDITOR of the *Agricultural Journal*.

SIR,—I have read with interest the letters which have recently appeared in your *Journal* in reference to the game-destroying propensities of the secretary bird. That this bird does eat the young of game birds, their eggs, and young hares, is beyond question; but it must be borne in mind that young partridges and quails are well able to take care of themselves. Their colour blends so closely with their surroundings, and their secretive

instincts being so largely developed, they can, as a rule, hide so securely that even the keen eyes of a secretary bird cannot detect them. Hares, owing to their fondness for human stercus, are not now sought after overmuch by sportsmen, and if the secretary bird does take toll of an occasional young one, it matters little or nothing.

Game birds and animals are a pest to the agriculturist, and if allowed to unduly multiply would make agriculture unprofitable.

I have examined the crops of large numbers of secretary birds, and find their general diet consists of rats, mice, lizards, snakes, centipedes, scorpions, spiders, beetles, caterpillars, and locusts. Now and then the young of birds, their eggs, and remains of small hares have been found in their crops.

I know many farmers who are implacable enemies of all the hawk tribe because occasionally one of them has developed chicken-eating habits. Many years ago in England the owl got into disfavour because a few farmers had some chickens devoured by owls. A war of extermination began. The owls which escaped destruction sought refuge in the innermost recesses of the forests, far from the haunts of man. Then the field mice and rats had a high old time. Their arch-enemy having vanished beyond their ken, they increased a thousand-fold. Hundreds of farmers were ruined and lived to bitterly regret their action in destroying the owls.

Let no man hastily raise his hand against the secretary bird.—Yours, etc.,

Port Elizabeth, 9th November, 1911. F. W. FITZSIMONS,
Director, Port Elizabeth Museum.

HARNESS V. YOKE—PRACTICAL TRIALS.

To the EDITOR of the *Agricultural Journal.*

SIR,—In your October issue A. G. G. Mylrea asks have any readers tried Schloss's Patent "Hercules" ox harness.

I have used it this season. I had one span of eight oxen with harness. Against this span I had a span of fourteen with yoke and skey. I kept these two spans side by side, doing the same amount of work in the same soil, ploughing the same depth in heavy black soil, with two-furrow Ransome disc ploughs.

As condition holders, the oxen were fairly even. Both spans started fresh on the 25th July, and ploughed steadily until the 2nd of November, when I knocked them off. During this time each team had done exactly the same amount of work. The yoke team lost condition, and two of them gave in, so I put fresh ones in their place. The harness team went strongly right through and finished up in better condition than the yoke team.—Yours, etc.,

Davel, Ermelo Dist., Transvaal, 4th November, 1911. GEO. MOSSOP.

SOAKING SEED BEFORE PLANTING.

To the EDITOR of the *Agricultural Journal.*

SIR,—Can you or any of your readers kindly let me know whether, if mealies and beans are soaked before sowing, or watered before the plant shows above ground, it affects their bearing?

I am told that empty cobs and pods, respectively, are the results in either case.—Yours, etc.,

Blauwkrantz, via Conway, C.P. A.B.C.

SWISS GOATS.

To the EDITOR of the *Agricultural Journal.*

SIR,—In the May number of the *Agricultural Journal* you have a short article on Swiss goats. It may be of interest to readers to know my experience with one of them.

In August, 1910, I bought a three-quarter bred ewe from Mr Rubidge, receiving her on the Saturday night. On Monday morning she had three ram kids, all different in looks and colour. She at once gave sufficient milk for the three kids, and about three bottles over for house use. She kept this up till the kids were about four months old, then I sold one and she gave about three and a half bottles a day for house use. A month later I sold one more, and as we did not require so much milk, let the remaining kid have as much as he could drink

morning and evening. We milked her in the morning, taking about two bottles away, and at about three o'clock in the afternoon again about one and a half bottles; and at half-past five she would be full of milk for the three kids, who were always full to go to sleep at nights. We fed her on bran and mealies, two handfuls of each every morning, and pegged her out during the day. She kept this up for ten months. Now again in August she had one ram kid, which came out pure white, while the former ones were all coloured. The young ram kid I kept has long hair and fine horns. The mother is of a bluish-grey colour; also has horns.

I bought another from the same breeder's stock later. She has also one ram kid. She too is dark bluish with black points, hornless, and her ram kid looks more like a wild buck than a goat. He is hornless also, beautifully marked, tawny with whitish large spots. The mother goat is not quite such a good milker as the other. We only take about five to six bottles from the two goats daily, as we do not require more. They are all in tip-top condition, having had throughout the winter and spring mealies and bran daily.

Before I got the one goat I kept a cow, but she never gave us more milk than the one goat did, as she was running on the veld, and gave a lot of trouble with herself and calf to look after.

I have very little trouble with the goats, as they are used to being pegged out. I use a strong dog-collar and a light chain or half-inch rope. They lead freely. When the mimosas are in leaf, I let them run amongst them. They require care. I made a warm shed of packing cases for them and I never let them out in winter rains or cold windy days.

The fifteen-months-old ram is worth seeing. He is very big for his age, and has very broad hind-quarters. Mr. Rubidge said he threw back to a noted Swiss milking breed.

With ordinary care there need be no fear of Malta fever. We have been using goats' milk only for the last fifteen months—the smallest children and the adults as well. *But* we always boil the milk soon after milking, both night and morning. The doctor says one bottle of goat's milk is equal to two bottles of cow's milk, and any one would see the difference after taking coffee with the rich goat's milk and trying same with cow's milk afterwards.—Yours, etc.,

Victoria Park, Somerset East, C.P. F. A. DE COURCY, F.R.H.S.,
14th November, 1911. *Curator.*

P.S.—I should say that Swiss goats crossed with the old class of Boer goat ewes, and bred up by using first-class Swiss rams, would be the most valuable for town use anywhere in South Africa.

I noted that most of the thoroughbred ewes which were bought by several householders here died out with their kids during the winter, one gentleman losing nearly twenty head. For small holdings nothing could be better than a Swiss goat; the three-quarter bred being hardy, and requiring very little food. By dipping two or three times a year they keep free of disease, and they keep in milk for about ten months or longer if wanted, though it is better to let them dry up before kidding time. The second ewe's kid is by the young ram, then about seven months old, I mentioned above; it is a perfect picture. From a distance would be taken for a wild buck.—F. A. DE C.

UNIVERSAL TRACTOR.

To the EDITOR of the *Agricultural Journal.*

SIR,—Can you or any of your readers give me information with regard to the universal tractor, made by Saunderson & Gilkins, of Bedford, England.—Yours, etc.,

Government Experiment Farm, Weenen, Natal. N. S. LIPP.

MAKING UP EARTH FLOORS.

To the EDITOR of the *Agricultural Journal.*

SIR,—Can any one tell me the *best* way of making up the earth floors commonly in use in farm houses, with raw linseed oil, so as to resist rough wear and tear?

Also how many coats of oil should be given, and the square feet that a gallon of oil will make good?

Also if coal-tar has ever been tried for this purpose, and, if so, with what result; and was it applied hot or cold?—Yours, etc.,

Athelstead Farm, P.O. Wolhuters Kop, via Pretoria, T. C. P. MAYNARD.
26th October, 1911.

VERMIN EXTERMINATION AND SCAB ERADICATION.

To the EDITOR of the *Agricultural Journal*.

SIR,—So much is being written on these two subjects, and I have been silent. I respect some of the letters on these subjects, but some of them are really ridiculous. The first point I wish to raise is the question of vermin. I think if there is a district that suffers much through vermin it is our district. I see so many recommendations in your *Journal* with regard to extermination, but there is only one remedy, and that is foxhounds. We have formed a society here for the purpose of exterminating jackals with foxhounds, and I can only say it has been a success so far. There are dissentients among us. Although the dogs have already from New Year up to now caught about eighty head of vermin, there are still people who say that they are no good, or that they can catch a jackal at your place but not at theirs. Some even go so far as to prohibit us from entering their fields with our dogs. As a cat is a means of exterminating mice, so is the foxhound the means for the extermination of the jackal. It should be well understood that we cannot hunt jackals any time of the year. This can be done only during a wet season, for the dogs would otherwise not be able to follow the scent. Sufficient proof of the efficiency of foxhounds lies in the fact that in those parts of the Cape Province where they are being kept the sheep are allowed to run unprotected day and night. A reliable man asked me to guess how many jackals his hounds had killed in five or six years. The number was 800. Was that not a tremendous success? I would advise every district to get foxhounds. But at the same time the services should be obtained of a man who can work well with them.

In the second place: Scab. What is the cause of scab? Vermin. Thousands of pounds are being spent on that microscopical insect, whereas hardly any money is spent on the jackal, which can be seen many miles off. My opinion is that the Government should enforce stringent measures for the extermination of vermin. It is a shame that such a lenient law should have been made. If a man wishes to cheat the law, he can always do so. A severe scab law should only be made after the vermin has been exterminated. And a person who persists in farming with scabby sheep may then be punished. Some people even go so far as to say it teaches a person to farm in a kraal. I expect strong criticism on this letter of mine.—Yours, etc.,

Treur Hoek, District Boshof. G. J. JOUBERT.

PRIZE LISTS FOR SHOWS.

To the EDITOR of the *Agricultural Journal*.

SIR,—The time having arrived for the making of prize lists for the agricultural shows, I wish particularly to advise the organizers of the societies concerned to put in classes for young cattle bred in the Transvaal; for instance, for (*a*) bulls less than twelve months old; (*b*) heifers less than fourteen months old; (*c*) one bull and two heifers less than two years old.

I have often noticed that animals are not well cared for in their youth, and that they consequently never grow to full development. A twelve-months-old heifer, which has been stunted in its growth, will never develop into a full-grown cow. One cannot care too well for calves less than twelve months old, and the judging of cattle in November or December would naturally result in their being looked better after the whole year round. This also applies to older bulls, which are only fed up for the show, but left to themselves again as soon as the show is over.

We must try and keep our bulls and young stock in good condition all the year round. I do not mean that we must fatten our breeding stock; what we should aim at is to give them sufficient food in order to grow and develop. And especially young bulls with a good pedigree should be cared well for and be placed in a nice and healthy stable.

Why should we not be able to breed first-class cattle here, the same as in other countries?

Bulls which got first or second prize at a show before they were two years old should not be allowed to compete, but should enter for exhibition only, and should receive a premium, together with their travelling expenses. The cattle should appear registered in a pedigree book, or otherwise their parents should be pedigree stock. And, further, pedigree cattle could be offered for sale after they had been judged.—Yours, etc.,

Bedford Farm, Johannesburg. L. B. v. D. VELDE.

ADVERTISING STOCK AND STOCK SALES.

To the EDITOR of the *Agricultural Journal.*

SIR,—Can you tell me the reason why breeders of good cattle do not advertise. I have been wanting to buy a few good milking cows for some time, but though I have watched the papers, breeders of pure stock never seem to advertise. Also, when there is a sale of dairy cattle occasionally a notice is put in the paper two or three days before the sale, which does not give an outside buyer a chance. For instance, a sale of dairy stock was held at Springs about a fortnight back. It was advertised in the Johannesburg *Star* for some days beforehand, but the first paper only reached me the day before the sale, which was too late for any buyer about here to attend.

If breeders and farmers selling good cattle would put an advertisement in the daily papers a week or ten days before, or, better still, in the *Agricultural Journal* published before the sale, I am sure they would get more buyers to attend. I notice plenty of advertisements for watches, etc., in the *Agricultural Journal,* also of sheep, but the cattle-breeders seem to leave it severely alone.—Yours, etc.,

"LINCOLN RED."

WET MAIZE TESTING.

To the EDITOR of the *Agricultural Journal.*

SIR,—The price of the Brown Duval tester for wet maize (page 409) seems to me excessive. £11 for a glass retort with thermometer, and tubing to pass through water, and a glass receiving measurer, is out of all proportion. Lamps are charged extra. Surely a wholesale druggist could supply these for 30s. or £2. I write in the hope that some one may take it up here in South Africa, without our having to send to America for what is, after all, a very simple apparatus.—Yours, etc.,

Reitz, Orange Free State. R. LEIGH, M.R.C.S.

Questions and Answers.

These pages will be devoted to questions, and an endeavour made to reply to all inquiries upon agricultural topics of general interest, or concerning any of the articles published from time to time in the *Journal*. In all cases replies will be posted to correspondents so soon as same have been procured.

Correspondents are requested to write on one side of the paper only. No manuscript will be returned.

All letters must be addressed to the Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria.

WINTER GRASSES FOR TROMPSBURG DISTRICT, ORANGE FREE STATE.

Morison & Birrell, Hamelfontein, Trompsburg, Orange Free State, ask:—What pasture grasses do you recommend for feeding sheep (or grazing) in winter? We have some ground we intend ploughing. The only water it would get would be rain drained from the kraals, etc. How much seed should be sown to the morgen, and should it be mixed with other seed? When should it be sown? We have a field of lucerne just below; would there be any fear when the grass ripens of the seed blowing into the lucerne and choking the latter?

Answer.—The Acting Under-Secretary for Agriculture, Bloemfontein, replied:—The grasses best suited to produce winter grazing on dry lands are tall fescue, cocksfoot, and tall oat grass. To these might be added other forage plants, such as sheep burnet and sainfoin. The following would be seeding required for one acre:—Tall fescue, 3 lb.; cocksfoot, 3 lb.; tall oat grass, 3 lb.; burnet, 2 lb.; sainfoin, 2 lb. The ground should be prepared by ploughing and harrowing as soon as possible, but it is not advisable to sow the seed until January. The above-mentioned mixture should be sown without other crop, although a good stand can also be obtained by distributing the seed in the mealie lands before the last horse-hoeing is done for the season. There would be no danger of these plants over-running the lucerne stated to occupy the adjoining plot.

LUCERNE: VARIETIES, SEEDING.

A. P. Lund, Aboukir, Lovat, Orange Free State, asks:—Which is the best variety of lucerne to plant, principally for stock feed, and what quantity of seed per acre should be sown, planted in drills about 2 ft. 3 in. apart?

Answer.—The Acting Under-Secretary for Agriculture, Bloemfontein, replied:—Provence is the most suitable type for all purposes. Eight to ten pounds of seed will be sufficient for one acre, sown in drills 24 to 30 inches apart.

EFFECT OF FERTILIZERS ON SOILS.

S. C. Liebenberg, Witpoort No. 620, Klerksdorp, Transvaal, writes:—I intend planting potatoes in January on a red sandy soil with fertilizers, but was told that fertilizers do very well for three years, and then my ground would be practically useless owing to the fertilizer taking out the growing properties of the soil. After that period I could apply fertilizers to any extent with no result at all. Is there any truth in the statement? The same farmer told me that he planted potatoes with fertilizers and some without it, and there was no difference at all. What would you recommend: fertilizers or ordinary kraal manure?

Answer.—The Lecturer in Chemistry, School of Agriculture, Potchefstroom, replied:—By the term "fertilizers" it is understood you mean artificial fertilizers. With regard to your query as to whether the statement made by a farmer to the effect that fertilizers do very well for a time and then refuse to act is true or not, a fact may be mentioned which may explain the observation and experience of the farmer referred to. If, in manuring

a soil, only one plant food ingredient is applied year after year in the form of an artificial manure—say, for the sake of argument, superphosphate to a soil poor in phosphates to start with—then, although the superphosphate may have given remarkably good results the first couple of years, with successive cropping such soil will ultimately become poor in nitrogen or potash or both, and the crop returns decrease, no matter whether the application of the superphosphate be doubled, for the crop year after year not only removes phosphates from the soil, but also nitrogen and potash, besides other substances generally present in an inexhaustible quantity in the soil. So that, by such a bad system of manuring, a farmer may ultimately find his soil in a worse condition than when he started. If, however, artificial manures are applied containing all three manurial ingredients (as well as lime given in cases where the soil requires it), phosphates, potash, and nitrogen, in quantities depending on the nature of the crop and soil, sufficient for the biggest crops, the danger of the soil becoming impoverished in any plant food is safeguarded. As regards your red sandy soil, which you intend putting to potatoes, I should say give a dressing of eight to ten tons to the acre of your kraal manure before putting in the potatoes. As farmyard manure is, however, comparatively poor in phosphates, and most of our Transvaal soils are deficient in that substance, I should advise you to give, in addition, as a trial, to a small piece of ground one-eighth to quarter acre in size, superphosphate at the rate of 200 lb. per acre as a top dressing (the dung having previously been ploughed in) immediately before planting, and compare the yield of this with a similar bit of land of the same size receiving dung alone. Superphosphate is the best form to apply phosphates to a soil requiring same, except to one poor in lime, when its continued use is not advocated, but rather some other form of phosphate, unless it be convenient to apply to the soil a dressing of air-slaked lime or ground limestone.

WINTER CROPS FOR SHEEP.

"Bechuana", P.O. Geluk, Bechuanaland, writes:—Could you kindly advise me as to the best dry-land winter crop to grow in these parts for sheep lambing in the winter? The soil is sandy, and the winters are, as a rule, dry, with occasional frosts. I have thought of chou moellier, teosinte, thousand-headed kale, and various other kinds of rapes and kales, and almost think that the "New Giant Kangaroo" rape would be the most suitable crop. As I want the crop for next winter there would not be time enough for lucerne. I want a large supply of green food that I can go and fetch a cartload of off the field whenever it is required.

Answer.—The Acting Under-Secretary for Agriculture, Bloemfontein, replied:—The ordinary Dwarf Essex rape is undoubtedly the best winter fodder you can grow for sheep and lambs. Thousand-headed kale is good, but requires a richer soil than rape. Chou moellier has not been proved, but seems to be worthy of a trial. It is a comparatively slow grower. Teosinte does not stand frost, and cannot be recommended in your case. Further trials are necessary to show whether Giant Kangaroo rape possesses any advantage over Dwarf Essex. In a test made in this Province during the past winter the Kangaroo did not appear any better than ordinary rape. For the production of a crop to be cut and drawn off the land the rape should be sown in rows 3 feet apart, using 2 lb. of seed per acre. In favourable conditions 15th March is a suitable date for seeding. A crop required for late winter should be sown in April.

CASTRATION OF BULLS.

In reply to an inquiry from P. J. van Breda, Struis Bay, Cape Province, the Veterinary Division state that the best time to castrate calves is when they are from three to six months old, according to their condition and development.

WEANING CALVES.

J. P. Gericke, Municipal Office, Prince Albert, Cape Province, asks for particulars of a simple way to wean calves while grazing with their mothers.

Answer.—The Acting Superintendent of Dairying replied:—I do not think you will successfully wean calves from their mothers while they are allowed to graze with their dams. The best method is to remove the calves from the mothers after calving, and place them out of sight and hearing of their mothers. By this means quick results are obtained in the direction of weaning, and the cows may be used soon for milking purposes. The weaning of calves otherwise is rather difficult with good dairy stock, and this would be all the more so in the case of Afrikander cattle.

DESTROYING SLUGS.

Fred. Oosthuyzen, sen., Freyensfontein, Aberdeen, Cape Province, asks :—Can any one give me a remedy against slugs which live in the soil and make their appearance at night, destroying all vegetables? They are a great nuisance to the Aberdeen market gardeners, who can plant what they like, but the slugs destroy everything.

Answer.—The Acting Union Entomologist replied :—The first matter to receive attention in combating slugs in gardens should be the reduction of their hiding and breeding places. They like places where the vegetation lies on the ground and keeps the soil beneath cool and damp, and such places are often thoughtlessly provided in neglected beds of vegetable or flowering plants that have passed the stage of usefulness. Often no further suppressive measure is necessary in much-infested gardens than abolishing such places and occasionally thinning out foliage that lies on the ground and dragging the surface soil that was beneath out into the sunlight so that eggs that were hidden there may dry out and perish. Not infrequently a weedy border of an open drain or irrigation ditch is a shelter where breeding of the pest goes on, and from whence vast numbers make nightly journeys into the garden. When such shelter cannot be prevented, it is generally practicable to poison the vegetation there, and thus to minimize the trouble. Slugs and snails seem quite susceptible to paris green and arsenate of lead, and it is safe to use these poisons on parts of plants that are not to be eaten, as well as on worthless vegetation on ditch sides. The ordinary strength of a pound of paris green to 200 gallons of water, or a pound of arsenate of lead to 25 gallons, is quite strong enough. Arsenate of lead possesses a number of advantages over paris green, amongst them being the lesser liability of its injuring plants, and its use is therefore preferable. Some vegetables, as beans for example, are particularly liable to be injured by paris green. Lime has long had a good reputation as a deterrent for slugs, and few will cross a band of it a second time if there is any " life " left in it. It is often a useful means of preventing the ingress of slugs from neighbouring premises. Old air-slaked lime naturally has little or no value for the purpose. Salt is even more effective than lime, and is similarly used, but it has the disadvantage of being injurious to plants.

DISEASE IN GRAPES.

G. Hurter, Coetzee Street, Middelburg, Cape Province, asks :—Will you kindly inform me what to do for rust in grapes—not that the pest is already with us, but it may appear if the summer is a bad one. The grapes here are still young, but if treatment is begun in time the appearance of the disease may be prevented. We think of using lime and sulphur, or sulphur alone.

Answer.—The Plant Pathologist replied :—I cannot quite understand what you mean by " rust " without having seen a few samples of your diseased grapes. It may be the disease known as " anthracnose " or " zwart roest ", or it might be the disease called " powdery mildew ". As the latter is rather prevalent in grapes in South Africa, I think it is the one to which you refer, and I should advise you to spray your grapes with a solution of iron sulphide, made as follows :—Put 4 lb. unslaked lime in a 25-gallon barrel, and slake the lime with 1½ gallons boiling water. Stir 4 lb. flower of sulphur in the slaking lime (the sulphur must first be passed through a fine sieve in order to break the lumps) and add another gallon of boiling water. Stir from time to time to prevent the sulphur from caking. Place a piece of sack-cloth over the barrel to keep in the heat which issues from the slaking lime; this heat will make the solution boil from ten to twenty minutes, according to the quality of the lime. During the boiling a small quantity of the sulphur is dissolved. As soon as the lime is slaked, i.e. when the boiling ceases, add water up to the 20-gallon mark, in order to prevent more sulphur being dissolved. The mixture is then passed through a sieve of twenty meshes to the inch, so that the lumps of lime can be removed; all the sulphur, however, must be passed through the sieve. Dissolve 1½ lb. sulphate of iron (or 1 lb. sulphate of copper) in 5 gallon of water, and add this to the mixture, which is then ready for use. It is advisable to spray with a " Success " hand-spray pump, which costs only 22s. 6d., and which can be used for all kinds of spraying purposes.

PEACH CUTTING FOR EXAMINATION.

A parcel containing what appears to be a cutting from a peach tree has been received, without letter of advice, from a Mr. E. W. Howarth, of Alicedale, Cape Province. The cutting was referred to the Acting Chief of the Division of Entomology, who replies :—The upper portion of the cutting is dead from causes not clearly apparent to me. There is no evidence of scale insect infestation, but there is surface pimpling, such as might be due to sun action on poorly nourished wood, and some gumming.

TULIP POISONING.

Geo. Green, Falconhurst, P.O. Coalbrook, Orange Free State, asks for particulars of a remedy for tulip poisoning.

Answer.—The Veterinary Division (Transvaal) replied:—We know of no reliable antidote to tulip poisoning, and even if we did it would help but little, as the poison acts rapidly, and animals are usually too far gone, when first noticed ill, for treatment to be of much avail. The treatment suggested is oleaginous purgatives, such as linseed oil, with stimulants such as whisky, brandy, etc., followed by nutrients such as linseed, oatmeal, or mealie-meal gruel. Some farmers speak highly of vinegar as a remedy: about two cupfuls in a bottle of water.

PIGS EATING BROKEN GLASS.

G. B. Mackenzie, Hilldrop, Newcastle, Natal, writes:—I would be much obliged if you could advise me of a remedy for pigs eating bits of broken bottles. The pigs are in a small run with plenty of running water, and have the shade of gum and other trees, and they also have properly covered-in styes. I have lost ten pigs, and on opening them find the glass has perforated the stomach. The pigs are fed on mealies, a few potatoes, separated milk, with a little green stuff thrown in occasionally. They also get coal cinders. I have had all the bits of broken bottles I can find removed, but as they root about they find small bits and chew at them.

Answer.—The Veterinary Division (Transvaal) replied:—The radical way to prevent pigs eating broken glass would appear to be to see that they cannot get at pieces of broken glass by rooting for it or otherwise. The fact that they want to chew glass would point to a depraved appetite, probably due to worms. If you suspect worms you might give santonin and castor oil, from 3 to 10 grains of the former in from 1 to 4 ounces of the latter, according to size and age of pig. The santonin can also be given in the pigs' food. One dose would be sufficient, but it can be repeated in a week or ten days if all the worms are not expelled.

DOG SUFFERING FROM WORMS.

N. S. Lipp, Government Experiment Farm, Weenen, Natal, asks what a fox terrier of his has been suffering from. The dog had the appearance of rheumatic fever, howling and crying whenever it stood up. It was given a dose of sulphur, followed by a dose of epsom salts, and seems to be much better now.

Answer.—The Veterinary Division (Transvaal) replied that the dog probably suffers from worms, and suggested that the animal be given 20 grains of powdered areca nut in an ounce of castor oil as a drench.

CATARRH IN FOWLS.

M. M. Walters, Moorreesburg, Cape Province, writes:—Every year some of my young fowls get sore eyes. Upon my treating them they do not get worse, but their sight is not restored to them for months. If I do not treat them inflammation soon sets in, with the result that the eyes close, and the bird loses one of its eyes or both of them, and dies from want of food. I have never yet removed the sick bird, although I consider the disease to be contagious. Poultry-keepers assure me that it is better to kill the birds as soon as the first symptoms appear, as they never recover completely. But every disease has its cure, therefore I shall try and give an accurate description of the disease, hoping to receive from you an accurate prescription of a remedy. The disease starts in this way. The chicken, generally at the age of three months, stands listlessly about with its bill raised in the air, which it opens occasionally as if gasping for breath. Whilst the other chickens are being fed, it moves continuously out of the way of the person who feeds them, as also of the other chickens. It will scratch its eyes and ears with its feet, one of the eyes or both of them afterwards becoming watery, and containing a small particle of froth. The chicken now begins to rub its head on to its shoulders, which get dirty, and it will often, in daytime or at night, hold its head under one of its wings, where a mass of slimy dirt accumulates. Later on the chicken is unable to open its eyes, with the result as described above. This year I hatched thirty-five chickens on the 22nd of July, fourteen on the 28th of July, and seven on the 22nd of August. They are all alive, and the cockerels crowed when they were three months old, i.e. they are strong and healthy; but four of them are now affected. I am keeping them isolated from the others. I apply a dilute solution of Jeyes' Fluid to their shoulders, and rub their eyes with Chamberlain's Ointment twice a day. They are not getting worse, but as they are not able to eat they are falling off in condition. I think

there must be an obstruction of the canal between the eyes or the nose or bill, on account of a cold, or otherwise that the virus of the disease has caused inflammation in the canal. In any case a remedy for this disease would be a blessing to poultry-keepers, as well as to the fowls themselves.

Answer.—The Poultry Expert (Transvaal) replied :—Your birds are evidently suffering from catarrh. This is usually due to fowls sleeping in draughty, badly-ventilated, or dirty houses, and birds bred from unhealthy or weakly stock are also very liable to contract this disease. In its early stages the cure is not so difficult, but when the disease is allowed to develop before treatment, the cure is generally a tedious business. Directly it is noticed that the fowl is affected, isolate at once in a warm place free from draughts, bathe the eyes and nostrils every day with warm water containing disinfectant, such as permanganate of potash, and every morning and night give one teaspoonful of water containing six to eight drops spirits of camphor, holding the head well back so that some of the liquid runs into the slit in the roof of the bird's mouth. In advanced stages of the disease it is wiser to kill the fowl, for even should you effect a cure the bird will not be suitable for stock purposes. I think that it is quite probable that the young stock in your yard which are contracting catarrh are bred from one or two fowls which have had the disease formerly and have recovered.

EGGS MISSING FROM POULTRY RUN.

J. W. Milner, Napier, Cape Province, writes :—I am missing several eggs from my poultry run every day, but up to the present have not been successful in discovering the culprit. The eggs disappear during the daytime, as I collect them regularly every evening at feeding time. It is impossible for a dog to get into the run, as it is enclosed with 6-feet wire netting. I am also convinced that human hands are not the cause of the mischief. It can hardly be the fowls, for the eggs disappear, leaving no trace whatever of being broken, except on two occasions, when I found a little of the yolk on another egg in the nest. The fowls lay in nest boxes on the ground, also in nests of their own making. Can you please suggest the thief ? Do cats eat eggs ? Is it possible for rats to carry them away and devour them elsewhere ? If the latter, would raising the nest boxes, say, 3 to 4 feet above the ground prevent the rats from getting at them ? My fowl-run is situate in the village, where some of the enemies of the poultry-run common to farms are, as a rule, seldom found.

Answer.—The Poultry Expert (Transvaal) replied :—It is of course impossible for me to tell you what is taking your eggs, and the only help that I can give is in the way of suggestions. Your idea of raising the nest boxes above the ground is a good one, for this would probably check the losses for a time, at least until the thief discovers the fresh place. Cats, dogs, rats, muishonds, meercats, snakes, and monkeys will all eat eggs, and you must not be too sure that a dog is not the culprit, for I have known lots of dogs which will negotiate 6-feet wire netting without any trouble. The thief may be one of your own fowls, for if you have egg-eaters they will probably eat the shells as well as the contents ; a snake would probably swallow the eggs wholesale, shell and all. Have any of your neighbours got a pet monkey roaming about ? If all other attempts to locate the thief fail, you might try a little poison in an egg, but before doing this you had better consult a lawyer, for there are, I believe, strict laws with regard to laying down poison. If you kill one or two of your own fowls you would at least have the satisfaction of having located the culprit.

ERECTION OF WINDMILLS.

John R. Loock, De Rots, District Hoopstad, proposes to erect a windmill, and asks : (1) Whether a mill placed over a well answers any better than one placed a distance away from the well ; (2) in his case he is not able to place the windmill over the source of the water, as he is on the Vaal River, and his intention is to place the mill on a high rock bank overlooking the river—56 feet from top surface of rock to surface of water in river. Would 30 feet away from the edge of the rock do for the machine ?

Answer.—The Acting Director of Irrigation replied :—(1) Provided the suction lift is not too high in your case, not more than 15 feet, both methods work satisfactorily. (2) If you erect a mill on an elevation of 56 feet above the surface of the water in the river, you must sink the pump down in a well so that the suction lift will not be more than 15 feet. This would be expensive in your case, as you state the site where you propose to erect the mill is solid rock. Perhaps you can select another site, where there is no rock, even if you have to place the mill in 100 or 150 feet from the river ; it will work satisfactorily, provided you can sink the pump down to about 12 feet from the surface of the water.

PLANT FOR IDENTIFICATION (CYPERUS).

S. Geo. Amm, Salem, near Grahamstown, Cape Province, writes:—I am enclosing specimens (for identification) of a plant, or grass, which has been introduced here of late years, and which threatens to become a great pest. It was brought to my farm about ten years ago with some apple trees from a Western Province nursery. At first there was only a small patch of the stuff, not much notice being taken of it. Soon, however, it began to spread, and though efforts were made to eradicate the plant it has spread over the whole orchard, and is spreading to adjoining fields. "Scoffling" is of no use whatever; ploughing and harrowing make it grow more vigorously; in fact, when firmly established, it appears to be impossible to get rid of. Two other farms in this neighbourhood that I know of are also infected (I believe from the same source), so I am writing this as a warning to others to be careful when getting trees from other parts. The plant is somewhat similar to what is usually called the "uintje", the bulb of which is a favourite food of the springhaas and guinea-fowl. This plant, however, is a much more vigorous grower, and crowds out everything else; it seeds in the autumn and dies down in the winter. Shall be glad to know if the plant is of any value as food for stock, and if not can you suggest any means for eradication.

Answer.—The Government Botanist (Transvaal) replied:—The plant is one of the sedges—a species of cyperus, probably *Cyperus rotundus*, and very nearly allied to the uintje. It is of no value, and can best be got rid of by winter fallowing, leaving the tubers and roots turned up and exposed to the sun and dry air.

RESCUE GRASS.

B. J. C. Naude, Nganduza, P.O. Butterworth, Transkei, Cape Province, forwards a sample of grass seed for identification, and also for advice as to whether it is a good fodder plant, and, if so, whether it will grow in unirrigated land where there is a good rainfall in spring and summer, but a dry winter.

Answer.—The Government Botanist (Transvaal) replied:—The specimen sent is rescue grass (*Bromus unioloides*). It is a good feeding grass, very nutritious, and much liked by stock. It does not do well in veld conditions in regions of dry winters. It is useful as an irrigated winter grass.

NOXIOUS WEED: DRABOK.

R. C. Brown, Bergville, Natal, forwards a plant for identification. This plant, which he found growing among his wheat, is known popularly as "drabok", and he asks what it is and whether it has any value as a fodder plant.

Answer.—The Government Botanist (Transvaal) replied:—Drabok, or darnel (*Lolium temulentum*), is an annual weed and is not suitable for forage, as it is poisonous if the ripe seed is eaten in quantity.

South African Produce Markets.

CAPETOWN.

The produce department of the firm of R. Müller, Capetown, reports under date of the 24th November, 1911, as follows:—

Ostrich Feathers.—The next London Auction Sales will be held on 4th December. Of course, it is impossible to state what turn the market will take. However, it may be said that prices ruling in Capetown remain on an average very firm. All classes of feathers are eagerly competed for. In fact, for many a line prices have been obtained which could not fairly be expected by the sellers. The quality of the feathers offered was partly very good. It is a pleasure to find that inferior feathers are not being offered in this market at all. A good many of the ostrich farmers are now making it quite a study to select superior birds, wherefrom advantage only can be derived. I would warn farmers not to cut their feathers too late, thus preventing their becoming too ripe, and in consequence of which the tips suffer, together with the plumage in general. As is sufficiently known, for tipless feathers the prices cannot be expected which are obtainable for sound feathers. The tendency of the Capetown market is sound, as will be seen from the following prices which are now ruling here, viz.:—

	£	s.	d.		£	s.	d.
Primes	19	0	0	to	27	0	0
First	13	0	0	„	18	10	0
Second whites	9	0	0	„	12	0	0
Third whites	4	0	0	„	7	10	0
Inferior and stalky whites	1	10	0	„	3	0	0
Byocks and fancy	2	0	0	„	9	0	0
Superior feminas	10	0	0	„	14	0	0
First feminas	7	10	0	„	10	0	0
Second feminas	4	0	0	„	6	0	0
Third feminas	1	10	0	„	3	10	0
Greys	1	10	0	„	9	10	0
White boos	1	0	0	„	3	0	0
Light boos	0	12	6	„	2	0	0
Dark boos	0	3	0	„	0	15	0
Inferior boos and tipless	0	1	0	„	1	0	0

	£	s.	d.		£	s.	d.
Long blacks	3	0	0	to	8	0	0
Medium blacks	2	0	0	„	3	15	0
Short blacks	0	10	0	„	1	5	0
Long floss black	1	7	6	„	2	10	0
Medium floss black	0	12	6	„	1	5	0
Short floss black	0	7	6	„	0	10	0
Long drabs	2	10	0	„	4	0	0
Medium drabs	0	10	0	„	1	5	0
Short drabs	0	3	0	„	0	7	6
Long floss drabs	1	7	6	„	2	10	0
Medium floss drabs	0	12	6	„	0	17	6
Short floss drabs	0	5	0	„	0	8	0
Inferior long blacks and drabs	0	15	0	„	2	15	0
Common blacks and drabs	0	1	0	„	0	5	0

Wool.—Rather extensive sales have been effected in this market at highly satisfactory prices. An excellent competition prevailed for long wools and all those of good sound quality. It will pay farmers best if they send their wool to the market as clean as it can possibly be done, not forgetting good sorting. Exporters have been found ready to buy any quantities of sound and clean wool, paying for same good prices. The following were realized in Capetown since I gave my last report, viz.:—

Karoo and roggeveld	7d.	to 8⅝d.
Malmesbury and Piquetberg	4½d.	„ 6½d.
Calvinia	5½d.	„ 7d.
Swellendam	8¼d.	to 9d.
Bokkeveld	7d.	„ 7¾d.
Coarse and coloured grease	4⅛d.	„ 4⅝d.

Skins.—The report has just arrived by cable that at the London Auction Sales of Cape goatskins 123,000 were sold, out of 177,000 which had been offered. All round, previous prices were maintained. A special strong demand existed for skins of extra light weights, for part of which an advance of ¼d. was paid. The Capetown market still continues to absorb unlimited quantities. For years dealers have every reason to be pleased with the prices they obtain at Capetown. I give the present local quotations:—

Goatskins, light	13½d. per lb.
Goatskins, heavy	10½d. per lb.
Angoras	6¾d. per lb.
Bastard angoras	10d. per lb.
Long wools, Caledon	5½d. per lb.
Long wools, grasveld	5d. per lb.
Long wools, others	4¾d. per lb.
Short wools	3½d. per lb.
Pelts	2¾d. per lb.
Damaged	3d. per lb.
Bastards	4½d. per lb.
Capes, large	3s. 3d. each.
Capes, medium	2s. 5d. each.
Capes, cut	1s. 3d. each.
Capes, damaged and lambs	0s. 8d. each.

PORT ELIZABETH.

Messrs. John Daverin & Co. report for the month of November as under:—

Ostrich Feathers.—Notwithstanding the lower level of prices now established for this article, a large quantity has again been disposed of locally during the past month, the total value which has passed the hammer during the four weeks just ended amounting to over £82,000. The weight sold was 36,222 lb., so that the average price realized is just over 45s. per lb. all round.

In addition to this quantity disposed of on the public market, a fairly large quantity has been shipped direct, and as new arrivals for the month have been limited, stocks held here to-day are considerably lower than they were at the commencement of the month. This fact may possibly help to arrest any further decline in prices, but the immediate future of the market will rest in a great measure with the results of the London December Sales, which take place next week.

At these sales some decline is expected, but as a decline has been discounted here, it is possible that values at this side may not suffer any further.

Throughout the month wings in general have sold fairly steadily on the basis of the reduced level of prices established since the last London Sales. Tails are also steady at unchanged prices. Spadonas are rather dearer, especially the better sorts. Floss continues in strong demand at very full prices. Long drabs have gone back slightly, but short are dearer. The only classes which have suffered any marked decline are long and medium blacks, which are very decidedly lower.

In general, good quality pluckings have come in for more attention than ordinary and common lots and have realized comparatively more satisfactory prices, and this state of affairs, we think, is likely to continue in the near future.

Wool.—The demand during the month has run on wools well grown, well got up, and in light condition; for this description very full prices have been paid. Special clips from the Highlands brought as high as 10¾d., and for special clips from the Bedford and Graaff-Reinet districts 9¼d. to 9½d. has been obtained. Wools from the Karoo have brought and are still worth up to 8d. for super-light full-grown clips.

Short wools, similar in condition to above, also find ready purchasers at 6d. to 7d. per lb.

Wasty, greasy, earthy clips have been and are still quite neglected and are difficult to move except at very low prices.

There has been a fair demand for super snowwhites free from fault; for this description up to 19d. has been paid. Faulty common snowwhites are difficult to move, and the prices obtainable for this description are unsatisfactory.

The wool season is now in full swing and clips are arriving freely. The demand for super wools continues active and there is nothing to indicate any setback.

At the catalogue sales held here during the current month 17,009 bales were offered, of which 6679 bales were sold.

The total quantity of wool shipped from this port during the month amounted to 13,247 bales, as compared with 9825 bales shipped during the month of October.

The London Wool Sales.—Our cable just received of the opening of the London Sales yesterday states:—"No change in prices of Cape wool."

Mohair.—More activity has been shown in the demand for this article during the current month than had been the case for months previously. The price of winter hair advanced from 7½d., the best price obtainable at the beginning of the month, to 8½d.; we succeeded in obtaining 8¾d. for 225 bales, which was an exceptional price. The demand has again eased off and 8d. is the best price obtainable to-day. In summer firsts a fairly large business has been done during the month at prices running from 10d. to 11½d. for strong and fine hair respectively. Transvaal and Free State hair, and especially long fine blue of twelve months' growth, is worth to-day 12½d. to 13d.; mixed and winter hair, 8½d. to 9d; Basuto hair, 10½d.

The stock held here at present is estimated at about 3500 bales. Of this quantity 2500 bales are summer firsts; 400 bales summer kids; 500 bales winter hair and kids; and 100 bales mixed.

The shipments for the month total 7130 bales, as compared to 3094 bales shipped during the month of October last.

Skins.—A good demand for all descriptions continues. About the middle of the month prices improved all round, and remain at that improvement.

EAST LONDON.

Messrs. Malcomess & Co. report for the month of November:—

The wool market during this month has taken a turn for the better. Labour troubles are, for the time being, settled and the war scare has blown over, nobody fearing international complications from the "Italian-Turko" squabble. Consequently dealers in wool seem to opine that values have dropped sufficiently and the future is clear enough for them to enter the market again. Wool values were, so to speak, on a moderate level at the beginning of the month, and this caused many orders to be cabled out, with the result that demand exceeded supply and caused every one to compete as keenly as possible, and so forced prices up gradually, till to-day we are on a level fully 5 per cent. to 7½ per cent. above that ruling at the beginning of the month. Buying moderately and consigning to a rising market has enabled, together with a clearance of old season's wools, large sales going through, as the following details show:—

1st Nov.	1,400	bales offered,	700	bales sold. Private treaty,	1,300	bales sold.
8th ,, ...	2,000	,, ,,	1,400	,, ,, ,, ,,	1,600	,, ,,
15th ,, ...	3,500	,, ,,	2,600	,, ,, ,, ,,	1,700	,, ,,
22nd ,, ...	4,300	,, ,,	2,700	,, ,, ,, ,,	1,800	,, ,,
	11,200	,, ,,	7,400	,, ,, ,, ,,	6,400	,, ,,

So that the total for the month is about 14,000 bales.

From Europe orders in greater number are being cabled out, and especially good short grease are being wanted.

Here long wools are to-day fetching more than European parity, owing to some Bradford buyers having sold ahead months ago at rates higher than those existing there at present.

From Antwerp cables advised a decline of 3 per cent. in their public sales of the 22nd inst. This decline had no effect on the local market, and all have been awaiting the verdict from the London Sales, which opened on the 28th, as follows:—Short grease, unchanged, in buyers' favour; heavy long grease and snowwhites, unchanged; super light long grease, firm, but not quotably higher.

We expect values to harden slightly as the sales go on; otherwise the improvement on this side has not been justified.

Cables have also reported that America is beginning to buy crossbreds, and the opinion seems to be gaining ground that they may sooner or later come in for fine merinos. We think this possibility has much to do with the spurt on this side. For over two years America has bought as little outside its own domestic wools as she could, and the time must soon come again when she will want more foreign wools.

We quote as follows:—

Transkei grease (native).....	5⅝d.	to	7d.
Basuto grease..............	5d.	,,	5¾d.
Ordinary native grease......	5d.	,,	5⅜d.
Super long skirted Kaffrarian, farmers..................	8d.	,,	11¼d.
Super short skirted Kaffrarian, farmers..................	7d.	,,	9⅜d.
Good long grassveld, well-conditioned.................	6d.	,,	8d.
Good short grassveld, well-conditioned.................	5d.	to	6¾d.
Long northern O.F.S., well-conditioned..............	6½d.	,,	7¼d.
Long southern O.F.S., well-conditioned..............	5d.	,,	7d.
Short faulty grease..........	4d.	,,	5¾d.
Coarse and coloured grease..	3d.	,,	5d.

Mohair.—Large transactions, mostly in mixed blue mohair, have taken place and about 1500 bales have been sold. Stocks in town are nothing to speak of, with values ruling on the following basis:—

Superior kids (when available).................	17d.	to	19d.
Average kids (when available)..................	16d.	,,	18d.
Winter kids.............	10d.	,,	12d.
Winter hair.............	7d.	,,	8¼d.
Superior long blue mohair	11d.	to	12d.
Average long blue mohair.	10d.	,,	11d.
Mixed, Orange Free State.	9d.	,,	11d.
Seconds and greys........	5d.	,,	6d.
Thirds...................	4½d.	,,	5d.
Basuto hair..............	9d.	,,	10½d.

Sundry Produce.—Sun-dried hides, 9d.; dry-salted hides, 7¾d.; goatskins, 12½d.; angora skins, 8½d; damages, each, 5d; sheepskins, 4¾d. for first quality. 3¼d. for second quality, and 3½d. to 3¾d. for Transkei parcels.

DURBAN.

Reid & Acutt's Wool Mart, Ltd., Esplanade, Durban, report for the month of November under date 29th November :—

The tone of the market all round has improved considerably during the month, and our November auctions have been marked by a healthy tone, keen competition, and an appreciable improvement in prices generally. This has been particularly the case with regard to long, well-grown, light-conditioned wools, and all such lots catalogued have changed hands at excellent rates. Short wools have also participated to some extent in the improvement, but the supply of six to nine months' clips is now falling off, and it is becoming evident that the majority of sheep farmers realize that it pays them best to shear a long twelve-months' clip.

Antwerp Sales opened on the 21st inst. with a decline in prices, and on our auction of 22nd inst., although there was no appreciable change in the market, the general tone was slightly duller and prices had a tendency to steady themselves. The London series of Wool Sales opens to-morrow, when it is not expected that any change of importance will be exhibited. The tendency, if anything, is likely to be downwards, but we do not anticipate that values for long, light wools on this market will show any change in the near future, although heavy-conditioned and short sorts may become a shade easier.

Coarse and Coloured.—This is in strong demand and shows a distinct advance in price.

Mohair.—This market, after a period of utter stagnation, is now beginning to show a slightly better demand, and prices for super sorts have improved within the last two weeks.

The following are prices current here to-day :—

NATAL.

Midlands.

Long light sorted clips....	10d.	to	12d.
Unsorted clips, light and clean....................	8½d.	„	10½d.
Bellies, pieces, etc.........	4d.	„	7½d.

Ladysmith, Newcastle, Dundee, etc.

12 months' sorted clips, light and clean................	8½d.	to	9½d.
12 months' average clips, light and clean................	7¼d.	„	8¼d.
12 months' heavy and faulty	6½d.	„	7d.
6 to 9 months' light and clean	6d.	„	6¾d.
6 to 9 months' heavy & faulty	5¼d.	„	5¾d.

Utrecht and Vryheid.

12 months' sorted clips, light and clean................	7½d.	to	8¾d.
12 months' average clips, light and clean................	6¾d.	„	7½d.
12 months' heavy and faulty	6¼d.	„	6¾d.
6 to 9 months' light and clean	5¾d.	„	6¼d.
6 to 9 months heavy & faulty	5¼d.	„	5¾d.

East Griqualand.

12 months' sorted clips, light and clean................	8½d.	to	9½d.
12 months' average clips, light and clean................	7d.	„	8¼d.
12 months' heavy and faulty	6½d.	„	7d.
6 to 9 months' light and clean	6d.	„	6¾d.
6 to 9 months' heavy & faulty	5¼d.	„	5¾d.

TRANSVAAL.

Volksrust, Wakkerstroom, Ermelo, Amersfoort, etc.

12 months' sorted clips, light and clean................	7¾d.	to	8¼d.
12 months' average clips, light and clean................	7d.	„	7¾d.
12 months' heavy and faulty	6½d.	„	7d.
6 to 9 months' light and clean	6¼d.	„	6¾d.
6 to 9 months' heavy & faulty	5½d.	„	6d.

Standerton, Bethal, Middelburg, etc.

12 months' sorted clips, light and clean................	7¼d.	to	8d.
12 months' average clips, light and clean................	6¾d.	to	7¼d.
12 months' heavy and faulty	6¼d.	„	6¾d.
6 to 9 months' light and clean	5¾d.	„	6¼d.
6 to 9 months' heavy & faulty	5d.	„	5½d.

Heidelberg, Pretoria, Potchefstroom, Klerksdorp, Lichtenburg, etc.

12 months' sorted clips, light and clean................	7d.	to	7¾d.
12 months' average clips, light and clean................	6½d.	„	7d.
12 months' heavy and faulty	6d.	„	6½d.
6 to 9 months' light and clean	5½d.	„	6d.
6 to 9 months' heavy & faulty	4¾d.	„	5½d.

ORANGE FREE STATE.

Harrismith, Vrede, Bethlehem, Heilbron, etc.

12 months' sorted clips, light and clean	8d.	to 9¼d.
12 months' average clips, light and clean	7d.	„ 8d.
12 months' heavy and faulty	6½d.	„ 7d.
6 to 9 months' light and clean	6¼d.	„ 6¾d.
6 to 9 months' heavy & faulty	5½d.	„ 6d.

Lindley, Kroonstad, Vredefort, Parys, etc.

12 months' sorted clips, light and clean	7½d.	to 8½d.
12 months' average clips, light and clean	6¾d.	„ 7½d.
12 months' heavy and faulty	6¼d.	„ 6¾d.
6 to 9 months' light and clean	5¾d.	„ 6½d.
6 to 9 months' heavy & faulty	4¾d.	„ 5½d.

Senekal, Ficksburg, Ladybrand, Winburg, etc.

12 months' sorted clips, light and clean	7d.	to 8d.
12 months' average clips, light and clean	6½d.	„ 7d.
12 months' heavy and faulty	6d.	„ 6½d.
6 to 9 months' light and clean	5¾d.	„ 6¼d.
6 to 9 months' heavy & faulty	4¾d.	„ 5½d.

Course and Coloured.

Free from Kemps	4d.	to 5d.
Ordinary	3d.	„ 4d.
Inferior, Kempy and Persian.	1d.	„ 2d.

BASUTOLAND AND NATIVE WOOLS.

Superior lots, light and clean	5¾d.	to 6⅜d.
Average lots, light and clean	5d.	„ 5¾d.
Average lots, heavy and wasty	4¾d.	to 5d.

MOHAIR.

Kids' good length and super quality	13d.	to 16d.
Long blue, super quality	11d.	„ 12½d.
Long blue, average	10d.	„ 11d.
Ordinary lots	8d.	to 9d.
Short and mixed winter	7d.	„ 8d.
Inferior and coloured	4d.	„ 6d.

BASUTOLAND AND NATIVE MOHAIR.

Average lots, mixed quality	9d.	to 10d.
Average lots, inferior	6d.	to 8d.

HIDES, SKINS, HORNS, ETC.

Hides.—Sun-dried, 14 lb. to 20 lb. average, 8d. to 8¾d. per lb.; sun-dried, inferior, 5d. to 7d.; salted, 6½d. to 7½d.

Sheepskins.—Long-woolled, 4½d. to 5d. per lb.; short-woolled, 3d. to 4d.; pelts, 1d. to 2½d.; coarse and coloured, 2d. to 3½d.; salted heavy, 3d. to 4d.

Goatskins.—Mixed parcels, sound, 3d. to 4d. per lb.; inferior, 1d. to 2½d.

Horns.—3d. to 10d. per pair.

WATTLE BARK.

Cut and bagged, good colour and quality, 5s. 9d. to 6s. 3d. per cwt.; cut and bagged, inferior colour and quality, 4s. 9d. to 5s. 6d.; uncut, in bundles, good colour and quality, 5s. to 5s. 6d.; uncut, in bundles, inferior colour and quality, 2s. to 4s. 6d.

Notes on the Weather of September, 1911.

CAPE PROVINCE.

By CHARLES M. STEWART, B.Sc., Secretary to the Meteorological Commission (Cape).

MEAN pressure slightly lower than usual; temperature lower than usual over the South-west, but above normal elsewhere; frosts during the first half of the month; a fairly high percentage of cloud, with a moderate number of fogs and mists; very few thunder-storms and little hail; very light showers of snow and sleet at one or two stations; dry weather throughout the greater part of the month except over the South-west; heavy rains on the last three days, causing floods, etc., in the South and East, and causing a mean rainfall considerably above the average; such were the characteristic features of the weather of September, 1911.

Division.	Mean Rainfall (1911).	Mean No. of Days.	Average Rainfall (1891–1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
Cape Peninsula......	6·82	13	3·55	10	+ 3·27	+ 92
South-West.........	3·30	9	1·99	6	+ 1·31	+ 66
West Coast.........	1·08	5	0·74	4	+ 0·34	+ 46
South Coast........	4·12	7	2·26	7	+ 1·86	+ 82
Southern Karoo.....	1·63	3	0·83	3	+ 0·80	+ 96
West Central Karoo.	1·10	3	0·53	2	+ 0·57	+ 108
East Central Karoo.	2·42	3	0·96	2	+ 1·46	+ 152
Northern Karoo.....	0·73	2	0·42	2	+ 0·31	+ 74
Northern Border....	0·03	1	0·15	1	− 0·12	− 80
South-East..........	2·52	4	2·14	6	+ 0·38	+ 18
North-East.........	0·84	2	0·99	3	− 0·15	− 15
Kaffraria...........	3·75	3	2·05	5	+ 1·70	+ 83
Basutoland.........	1·29	2	1·22	4	+ 0·07	+ 6
Orange Free State...	0·46	2	0·73	2	− 0·27	− 37
Durban (Natal).....	—	—	3·49	—	—	—
Bechuanaland.......	0·01	1	0·40	1	− 0·39	− 98
Rhodesia...........	0·00	0	0·16	1	− 0·16	− 100

Precipitation during September amounted on the mean of 338 stations to 2·54 inches on four days, being 0·87 inch, or 52 per cent. above the average. This amount is 0·96 inch more than during August, and 1·56 inch in excess of the amount registered during September, 1910. If, however, the 122 Orange Free State stations be included, the mean becomes reduced to 1·97 inch on four days, or 0·74 inch more than the corresponding value for last month. From the accompanying table it will be seen that excessive precipitation was common to eleven of the sixteen sections of the country, notably over the Central and Southern Karoos, and the Cape Peninsula. The excess was greatest (+ 152 per cent.) over the East Central Karoo and least (+ 6 per cent.) over Basutoland. Practically no rain fell over Rhodesia, Bechuanaland, and the Northern Border, while a deficiency of precipitation amounting to 37 per cent. occurred in the Orange Free State, and of 15 per cent. over the North-east. Compared with last month, the divisions showing a decreased precipitation were the West Coast, West Central Karoo, Northern Karoo, Northern Border, Bechuanaland, and Rhodesia; whereas over the other parts of the country the increased amounts registered were commonly from 50 to 100 per cent. more than in August, and being roughly 250 per cent. more over Kaffraria. Again, comparing these divisional means with those for September of last year, it is seen that a diminished rainfall was confined to the more northerly sections, viz. Northern Border, Bechuanaland, and Basutoland, while absolute drought prevailed over Rhodesia during both months; the increased amounts over the other divisions were mostly two to three times the quantities recorded during the corresponding month of 1910. Summarizing the monthly totals, it is found that of the 460 stations, only 36 had Nil, mostly in the more Northerly parts of the country; 112 had 0·01–0·50 inch; 62 had 0·51–1·00 inch; 76 had 1·01–2 inches; 56 had 2·01–3 inches; 45 had 3·01–4 inches; 23 had 4·01–5 inches; 16 had 5·01–6 inches; 13 had 6·01–8 inches; 3 had 8·01–10 inches; 5 had 10·01–12 inches; the remaining 3 with amounts exceeding 12 inches being Woodhead Dam, 12·19 inches; Waai Vlei, 15·76 inches; and McLear's Beacon, 17·79 inches, all on Table Mountain. Evelyn Valley, with

11·75 inches, was the only station outside the Cape Peninsula with a total exceeding 10 inches. On similarly treating the maximum amounts recorded in twenty-four hours, it is seen that of the 319 stations furnishing the necessary particulars, 30 had Nil, and 50 had 0·01–0·50 inch; 71 had 0·51–1·00 inch; 102 had 1·01–2 inches; 42 had 2·01–3 inches; 21 had 3·01–4 inches; the three heaviest falls being 4·50 inches at Emerald Hill (Port Elizabeth), 4·65 inches at Port Elizabeth, both on 29th, and 5·63 inches at Evelyn Valley on 30th. The heavy rain at Port Elizabeth on the 29th caused a flood, the Baakens River being reported to have risen to within a foot of the height reached by that of 19th November, 1908. Less damage was caused on this occasion, although bales of wool, trees, carcases of sheep, oxen, etc., were washed down, one native boy being drowned. The observer at the lighthouse reports: "29th—Light showers from 8 to 9.30 a.m. Heavy downpour from 9.30 to 11.30 a.m.; 4 inches of rain fell in two hours, with a few claps of thunder between 11 a.m. and noon. Frequent light showers from 11.30 a.m. till 2 a.m. on 30th. During the downpour the Reserve was practically a sheet of water." The number of *thunderstorms* reported was unusually small for the month, being noted as occurring on only ten days at thirty-four stations, mostly on the last five days of the month, particularly the 29th and 30th. *Hail* was reported at single stations on 5th, 15th, and 30th. Slight falls of *snow* occurred at Algeria (Division Clanwilliam) on 4th, and Glencairn and Isidenge on the 11th, and *sleet* at six stations on five days.

Temperature, Cloud, and *Wind.*—The mean temperature of all stations was 59°·0 or 6°·2 higher than last month, and 1°·1 above the mean maximum corresponding temperature of September, 1910. The mean maximum (70·5) was 7°·5 higher than the preceding month, and 1°·6 higher than during the corresponding month of last year; while the mean minimum (47°·6) was 4°·9 higher than in August last, and 0°·6 above the corresponding value of the previous September. The mean daily range was 22°·9. Compared with the normals, the mean monthly temperature was 0°·9 higher than usual, the mean maximum being 1°·3 and the mean minimum 0°·2 above the corresponding averages. At the individual stations the mean day temperatures were mostly considerably above the normals, the excess ranging from 0°·5 at Uitenhage to 6°·1 at Port Nolloth, but being mostly 3–4° over the greater number of the stations in the East. Over the South-west and parts of the South, however, there was a deficit in the mean maxima of about 2°. Similarly, the mean night temperatures were mostly a few tenths less than usual over the South-west, as well as over parts of the South-east, Kaffraria, and the North-east, but generally speaking were between 1–2° higher than the normals. Consequently, the monthly temperatures were commonly about 1° lower than usual over the South-west and at a few stations in the South (as well as at Bloemfontein), but were mostly 1–2° in excess of the normals over the rest of the country. The mean warmest station was Mochudi (66°·7), and the mean coolest Disa Head (Table Mountain), with a temperature of 50°·0, a difference of 16°·7. The highest mean maximum was 87°·6, also at Mochudi, and the lowest mean minimum 36°·3 at Hanover. The highest readings occurred most widely on the 14th, and were recorded at some stations on 1st to 3rd, 8th, 12th, 15th to 17th, 21st, 23rd, 25th, and 27th. The lowest readings were registered mostly during a cool spell from the 3rd to 9th, more particularly on 6th, but also on 1st, 12th, 13th, and 22nd. The mean value of the extreme maxima was 88°·8, or 8°·2 higher than last month and 0°·6 higher than in September, 1910; while the mean of the lowest readings (35°·5) was 1°·0 higher than during August last, and the same amount above the corresponding value of the previous September. The mean monthly range was therefore 53°·3. The highest temperature recorded during the month was 103°·2 at Mochudi on the 23rd, and the lowest 19°·0 at Hanover on 6th, causing an extreme monthly range over all stations of 84°·2. *Frosts* were mostly confined to the first half of the month, being severe enough to kill fruit blossoms at Theefontein (Hanover) on 13th, and damage fruit at Kokstad, although Sutherland reports frost nearly every morning. This phenomenon was most widely experienced from 1st to 6th; in all eighty-nine instances were reported on sixteen days, considerably less than last month, but more than double the number reported in September of last year. At Retreat, in the Cape Peninsula, the mean minimum over grass was 43°·3, or 4°·7 lower than the mean shade minimum, and about the same as last year; this thermometer fell below freezing point on the mornings of the 7th and 13th, reading 28°·2 on the latter date, as against 29·0 on the 7th September, 1910. The mean percentage of *cloud* was 46, or 4 per cent. more than the corresponding month of last year. The amount was greatest (about 60 per cent.) over the Cape Peninsula and over the South-west along the South Coast, decreasing to 40–50 per cent. over the South-east and Kafraria, and falling to 10 per cent. at Kuruman. The cloudiest station was Disa Head, with 72 per cent., and clear skies were reported as having been experienced at Mochudi all through the month.

Fog and *mist* were practically of the same frequency of occurrence as during August and slightly less frequent than during the previous September, eighty-one instances being noted on twenty-five days, most widely on 28th. The prevailing *winds* were easterly at Port Nolloth, north-easterly at Dassen Island, and westerly elsewhere except at Aliwal North where they were south-easterly, Kokstad where north-westerly and south-easterly were

of equal frequency, and Kuruman, Mochudi, and Durban where they were from a north-easterly direction. The mean *force* on the Beaufort scale was 1·87, corresponding to a mean velocity of 7·6 miles per hour, or 0·7 miles per hour less than during the corresponding period of the previous year. The force was greatest over the South-west, and least at some of the stations in Kaffraria. At the Royal Observatory there was a large excess of north-westerly, westerly, and south-easterly winds, as well as a slight excess of those from some intermediate points, but a large deficit in those from the south, south-south-easterly, and northerly points of the compass. The mean velocity there was 5·9 miles per hour, or 1·4 miles per hour less than usual. *Strong winds* and *gales* were reported from thirty-four stations on seventeen days, principally the 30th. *Hot winds* occurred at seventeen stations on twelve days, chiefly 1st and 2nd. No *duststorms* noted. Mean barometric pressure at the Royal Observatory was 30·14 inches, or 0·01 inch less than usual, ranging from 30·57 inches on the evening of the 11th and morning of the 12th, to 29·87 inches on the evening of the 26th.

TEMPERATURE.

Station.	Mean Max.	Mean Min.	Month Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory	62·7	50·1	56·4	86·5	14th	42·0	7th
Capetown (South African Coll.)	63·9	48·1	56·0	87·0	1st	41·0	6th
Capetown (City Hospital)	64·8	51·0	57·9	85·5	14th	42·0	6th
Capetown (Gardens)	69·2	52·8	61·0	92·0	1st	43·0	6th
Table Mountain (Disa Head)	55·5	44·6	50·0	78·0	14th	36·0	6th
Blaauwberg	63·1	51·2	57·2	86·9	1st	42·2	6th
Bishopscourt	64·8	45·6	55·2	86·5	14th	36·5	6th
Wynberg	68·2	48·9	58·5	87·8	1st	41·0	6th
Groot Constantia	64·4	49·6	57·0	86·6	14th	42·0	5th
Retreat	66·9	48·0	57·4	89·7	1st	35·2	7th
Groot Drakenstein	67·0	47·6	57·3	89·9	14th	36·3	6th
Danger Point	61·9	52.0	57·0	86·0	1st	40·0	6th
Elsenborg (Agricultural Coll.)	60·8	45·6	52·2	88·5	14th	36·9	6th
Porth Nolloth	69·4	46·8	58·1	96·0	14th	40·0	9th
Anenous	70·9	58·9	64·9	86·0	12th	50·0	8th & 22nd
Heidelberg	71·8	46·6	59·2	90·0	14th	37·0	8th & 13th
Port Elizabeth	70·1	53·0	61·5	90·0	2nd	44·0	7th
George Plantation	67·9	49·0	58·4	86·3	14th	37·0	6th
Uitenhage	75·1	47·0	61·0	92·6	14th	32·0	7th
Dunbrody	78·8	46·2	62·5	92·0	14th & 15th	30·8	13th
Cape St. Francis	68·0	53·8	60·9	91·0	14th	45·0	1st
Cape Agulhas	63·6	52·0	57·8	89·0	1st	41·0	6th
Amalienstein	72·4	45·0	58·7	84·0	1st, 3rd & 14th	29·0	6th
Hanover	71·3	36·3	53·8	88·0	21st	19·0	6th
Murraysburg	70·2	37·9	54·0	82·0	25th	23·0	6th
Bedford	75·1	47·1	61·1	89·0	17th	30·0	13th
East London	70·0	54·5	62·2	94·0	16th	45·0	13th
Cathcart	71·4	46·7	59·0	82·5	25th	29·5	7th
Kingwilliamstown	77·1	47·9	62·5	95·0	17th	30·0	12th
Sydney's Hope	72·3	51·4	61·8	85·2	14th	42·0	12th & 13th
Lovedale	76·5	47·9	62·2	90·0	16th	33·0	6th & 13th
Evelyn Valley	67·0	45·8	56·4	85·0	17th	30·0	6th
Chiselhurst	76·9	52·9	64·9	94·0	8th	43·0	12th
Aliwal North	78·3	38·1	58·2	87·5	25th	23·0	7th
Main	74·1	47·4	60·8	87·9	23rd	32·2	6th
Kokstad	74·4	40·8	57·6	90·2	27th	27·9	1st
Umtata	76·1	45·6	60·8	88·0	21st	33·0	1st & 7th
Tabankulu	74·4	46·8	60·6	89·7	27th	33·3	13th
Teyateyaneng	73·2	41·7	57·4	86·0	25th	28·0	6th & 7th
Kuruman	78·5	39·9	59·2	92·0	25th	29·0	4th
Mochadi	87·6	45·8	66·7	103·2	23rd	31·0	1st
Matopo Park	77·1	48·3	62·7	94·0	25th	32·0	3rd & 4th
Means	70·5	47·6	59·0	88·8		35·5	
Extremes				103·2	23rd	19·0	6th

OBSERVERS' NOTES.

Vruchtbaar (*Wellington*).—This is one of the exceptionally wet Septembers we have had.

Kersefontein (*Piquetberg*).—The rain on the 15th saved the crops, which the preceding fortnight's very hot weather was scorching badly.

Harkerville (*Knysna*).—Crops looking well in the district.

Kruis River.—Very dry until the 28th, when a glorious rain fell, giving us here a total of 4·91 inches; the heaviest rainfall since 1905 for September. River in heavy flood. Previous to rain, crops were suffering greatly, especially forage. Some very warm, close weather during the month, with good deal of wind, chiefly south-westerly and north-westerly. A slight frost on 1st, 13th, and 14th.

Uitenhage Park.—A very dry month up to 28th. Seven hot winds and two frosts; drying south-westerly winds. Bulk of heavy rainfall on 29th fell between 1 p.m. and 4 p.m.

New Bethesda.—Really a grand rain, bound to improve things wonderfully—just at the right time for crops and veld.

Sutherland.—A very cold month; frost nearly every morning.

Theefontein (*Hanover*).—Severe frosts from 1st to 15th—thermometer registering 9° on 13th, with intensely cold westerly and southerly winds. Fruit blossoms killed. Rain on last two days (1·37 inches), with strong southerly winds. Loss of stock locally inconsiderable.

Varkens Kop (*Middelburg*).—River in high flood, over the banks on 30th.

Huxley Farm (*Stutterheim*).—Farming operations are practically at a standstill owing to the drought. Live stock very poor. High winds plentiful up to the 26th. However, since the fine heavy rain on the 29th and 30th, things will be all well again, and farmers will get a move on.

Clifton (*Sterkstroom*).—Very dry month. Crops beginning to suffer. Fruit, veld, stock doing well.

Lyndene (*Albert*).—Until the 30th, veld very dry. Stock of all kinds rapidly falling off in condition. Corn looking well. Heavy frosts have destroyed much of the setting fruit.

Sunnymeade (*Albert*).—Very cold first part of month; latter half quite warm and with continual winds from north-east. Should work up rain. Stock and crops improving slowly.

Kokstad.—Heavy rain; river overflowing; has not been so high for the last thirteen years.

Groot Drakenstein.—Exceptionally wet and rather cold weather prevailed during the month; the total rainfall having only once being exceeded in eighteen years, viz. 8·46 in 1902. This large excess brought us up from considerably below to slightly above the average and was of the greatest benefit to the land. Vegetation generally very backward. Mean temperature 0·8 below the average. Rainfall 4·77 inches above the average (263 per cent.). Cloudiness was also considerably above the average, the sky being completely overcast eight mornings in succession, from 16th to 23rd.

Kokstad (*Coyté*).—Severe frosts early in the month, it is feared damaged, certain fruit. Very hot winds and dry weather lasted until the 29th, when copious rains fell.

NATAL PROVINCE.

THE heavy continuous rainfall throughout the Province that began on 30th September (referred to in last month's notes) did not in some places finally cease till the 3rd or 4th October, with the result that, except at one or two stations in the Midlands, the total for the period from 1st July to 31st October was noticeably in excess of the total for the corresponding period in 1910. While the downpour was exceptionally great along the Coast, the Midland and Northern Districts generally did not receive more than a good soaking rain, varying in depth from between 1 and 2 inches at Estcourt, Paulpietersburg, and Nongoma, to between 5 and 6 inches at Pietermaritzburg, Bulwer, Utrecht, Vryheid, and Mahlabatini.

Light rains fell everywhere during the remainder of October, and occasional thunderstorms were reported from many inland stations. Heavy hailstorms occurred on the 24th at Dundee, on the 28th at Greytown, Howick, Nottingham Road, Ngomi Forest, and Nongoma, and on the 30th and 31st at Nottingham Road. The forester at Ngomi reports that on the 28th the hail was very severe about twenty miles to the south and south-east, where it destroyed the whole of the crops.

A table is appended containing particulars of the temperature at thirty-five stations in the Province. Speaking generally, the mean temperature was high for the month of

October, and it will be noticed that the absolute maximum ranges from 92° to 114° throughout, with the single exception of Bulwer, 5100 feet above sea-level, where the thermometer reached 89°. This maximum refers in nearly every case to the 18th, which was a memorably hot day.

TEMPERATURE (NATAL), OCTOBER.

Station.	Mean Maximum.	Mean Minimum.	Monthly Mean.	Abs. Maximum.	Abs. Minimum.	Mean Daily Range.
	°	°	°	°	°	°
Observatory, Durban	78·7	63·8	71·2	99	56	14·9
Stanger	82·0	61·8	71·9	112	57	20·2
Verulam	82·0	62·4	72·2	114	54	19·6
Hillary	77·1	63·0	70·1	106	56	14·1
Winkle Spruit	77·6	61·1	69·3	100	52	16·5
Port Shepstone	78·3	60·4	69·4	92	52	17·9
Imbizana	78·3	60·3	69·3	98	54	18·0
Umzinto	90·5	49·7	70·1	105	45	40·8
Mid-Illovo	73·2	57·3	65·2	101	48	15·9
Bulwer	69·1	50·2	59·7	89	40	18·9
Richmond	76·3	53·9	65·1	99	45	22·4
Himeville	74·8	46·2	60·5	92	40	28·6
Pietermaritzburg	78·5	55·6	67·0	102	45	22·9
Cedara Vlei	74·0	50·4	62·2	95	41	23·6
Howick	76·5	53·1	64·8	96	45	23·4
New Hanover	82·5	53·8	68·2	99	40	28·7
Krantzkop	82·4	61·2	71·8	95	47	21·2
Greytown	79·1	53·2	66·1	98	44	25·9
Lidgetton	81·5	44·3	62·9	95	37	37·2
Nottingham Road	78·6	47·1	62·9	96	37	31·5
Estcourt	94·4	44·9	69·6	100	30	49·5
Weenen	85·9	55·8	70·9	100	45	30·1
Mpofana	76·6	54·6	65·6	97	45	22·0
Ladysmith	83·8	55·7	69·7	101	47	28·1
Dundee	80·2	56·2	68·2	94	46	24·0
Newcastle	81·5	50·8	66·2	96	38	30·7
Vryheid	76·5	53·8	65·1	92	35	22·7
Paulpietersburg	84·8	50·2	67·5	96	40	34·6
Ngomi Forest	73·4	53·0	63·2	92	41	20·4
Ubombo	75·7	61·7	68·7	97	55	14·0
Hlabisa	77·5	61·8	69·7	95	53	15·7
Mahlabatini	81·4	50·1	65·7	95	44	31·3
Melmoth	79·4	57·4	68·4	104	45	22·0
Empangeni	82·4	61·4	71·9	108	50	21·0
Mtunzini	85·6	50·8	68·2	112	40	34·8
MEANS	79·7	55·1	67·4	—	—	24·7
EXTREMES	—	—	—	114	30	—

TRANSVAAL PROVINCE.

OBSERVERS' WEATHER REPORTS.

SUMMARY.—The rainfall during October occurred at the beginning and at the end of the month, the middle of the month being practically rainless. In quantity the total fall has not been exceptional; over the western portion of the Transvaal it was slightly below the average, and over the eastern and the extreme south-western districts there was an excess. The season's rainfall (four months) also shows a slight deficit over the western half of the Province and a slight excess over the eastern.

BETHAL DISTRICT—

Leeuwkuilen.—With the exception of the beginning and end, October has been a very dry and hot month. The 17th to 22nd was unusually hot for the time of the year; the thermometer registered 82 degrees in a very cool house. About the same dates the grass, which had been beautifully green, was practically scorched up; a thunderstorm, however, on the 23rd, saved the situation.

On the 15th a rather severe hailstorm was experienced, which did considerable damage to the fruit in prospect.

On the 24th and 27th terrific windstorms occurred during the night. (W. J. Wayland.)

CAROLINA DISTRICT—

Waterval Boven.—Good rains fell during the first week of the month. A few stormy days were experienced. During the last part of the month good rains fell at intervals. (H. C. Borcherds.)

ERMELO DISTRICT—

Tweefontein.—Rainfall for the month has been unsatisfactory. Ploughing in many cases had been delayed on account of insufficient moisture. Germination of seeds has, on the whole, also been unsatisfactory, due to excessive heat and lack of sufficient moisture. (G. W. Smits.)

LICHTENBURG DISTRICT—

Doornbult.—Weather very promising daily. Severe hailstorm passed over here on the 28th. Heat very severe. (J. S. G. Smith.)

LYDENBURG DISTRICT—

Belfast.—Pleasant rains fell at the beginning of the month, with odd showers towards the close. A heavy hailstorm passed through this station about 2 a.m. on the 29th. It was of short duration, but nevertheless was severe enough to badly mark all fruit and young trees. Another storm passed to the south of this station on the 30th, travelling towards the east. (G. J. Imrie.)

Graskop.—Thunderstorms were frequent, and three times during the month hail fell, but did no damage. (G. Irvine.)

MIDDELBURG DISTRICT—

Middelburg.—The prevailing wind has been from the north-west. On one day only did the wind veer round to the quarter from which we expect good, soaking, steady rains, viz., the south-east. It rained the next day, but the wind returned to the north-west and the rain went off. Though but small amounts of rain fell at a time, with the exception of the 1¼ inch which fell on the 2nd, the subsoil has mostly remained moist, and allowed of tillage throughout the district. The month has been, on the whole, a hot one. (Dr. H. A. Spencer.)

POTCHEFSTROOM DISTRICT—

Hartebeestfontein.—From about the middle of the month to the 22nd the weather was oppressively warm and murky. (W. C. Nesbit.)

Strathmore.—For the month of October the weather has been exceptionally windy. (C. Scott.)

PRETORIA DISTRICT—

Wilderness.—An exceptionally dry month; no water in river (Aapies River); pasture very poor; stock in shocking condition; total failure of some crops. (J. R. G. Ferris.)

ZOUTPANSBERG DISTRICT—

Louis Trichardt.—Conditions during the month have been more or less as might have been anticipated for the season. The absolute drought of September was broken during the first week of October by a period of six days of dull and rainy weather, but another spell of drought and parching heat followed, and much retarded vegetation. Heavy thunderstorms occurred on the nights of 3rd and 30th, when 1·72 and 1·24 inches respectively of rain were registered. Rain fell in small quantities on ten other days. (Sergt. J. C. Clark, T.P.)

Pietersburg.—Rain fell early in the month; the remainder was extremely dry to the end. The greater part of the month was remarkably windless and hazy. (C. C. Hicks.)

Verzamelhoek.—After a hot spell during the latter half of the month the usual summer weather was experienced—two or three days' heat, followed by a strong wind or rain storm, and then damp mists and cold for two or three days. (G. F. Kay.)

The Rainfall for October, 1911.

CAPE PROVINCE.

I. Cape Peninsula:	Inches.
Capetown (South African College)	1·53
Do. (Molteno Reservoir)	1·65
Do. (Signal Hill)	0·71
Do. (Hospital)	1·05
Sea Point (The Hall)	1·06
Camp's Bay	0·94
Table Mountain (Disa Head)	1·92
Do. (Kasteel Poort)	3·10
Do. (Waai Kopje)	4·24
Do. (St. Michael's)	4·31
Woodstock (The Hall)	1·17
Bishopscourt	4·40
Kenilworth	3·32
Wynberg (St. Mary's)	4·17
Groot Constantia	3·42
Tokai Plantation	3·51
Muizenburg (St. Res.)	3·55
Do. (Coupar)	2·26
Cape Point	0·22
Blaauwberg Strand	1·01
Robben Island	1·11
Maitland Cemetery	1·28
Tamboers Kloof	1·30
MacLears Beacon	5·38
Waai Vlei	4·75
Woodhead Dam	3·26
Retreat	2·50

II. South-West:	Inches.
Eerste River	1·18
Klapmuts	1·91
Stellenbosch (Gaol)	1·67
Somerset West	1·68
Paarl	2·56
Wellington (Gaol)	2·08
Groot Drakenstein (Weltevreden)	2·45
Porterville Road	2·26
Tulbagh	0·97
Ceres Road	3·57
Rawsonville	2·24
Worcester (Gaol)	0·85
Karnmelks River	0·75
Lady Grey (Division Robertson)	1·17
Robertson (Gaol)	1·52
Do. (Govt. Plantation)	1·23
Danger Point	1·14
Elsenberg Agricultural College	1·54
Roskeen	1·21
Vruchtbaar	2·81

II. South-West (*continued*):	Inches.
Ceres (Heatlie)	3·56
Waverley (Tulbagh)	2·44
Dwaars Riviers Hoek	5·19
De Doorns	0·67

III. West Coast:	Inches.
Port Nollith (Lieut. Barber)	0·00
Anenous	0·42
Kraaifontein	0·12
Concordia	0·10
Garies	0·18
Van Rhyn's Dorp	0·16
Dassen Island	0·33
The Towers	0·94
Malmesbury	1·40
Piquetberg	1·45
Wupperthal	0·57
Hopefield	0·78
Algeria (Clanwilliam)	2·31
Cedarberg (Clanwilliam)	4·33

IV. South Coast:	Inches.
Cape Agulhas	2·41
Swellendam	2·48
Heidelberg	1·03
Riversdale	1·65
Mossel Bay	2·05
Great Brak River	1·37
George	3·51
George (Plantation)	3·71
Millwood	4·00
Sour Flats	3·36
Concordia	3·62
Buffel's Nek	2·85
Plettenberg Bay	1·85
Harkerville	3·27
Lottering	5·56
Humansdorp	2·15
Cape St. Francis	0·90
Kruis River	1·76
Uitenhage (Gaol)	1·85
Do. (Park)	1·59
Do. (Inggs)	1·82
Dunbrody	2·19
Port Elizabeth (Harbour)	1·72
Do. (The Slip)	1·82
Do. (Walmer Heights)	1·80
Shark's River (Nursery)	1·58

IV. SOUTH COAST (*continued*):	*Inches.*
Centlivres	1·98
Edinburgh	3·65
Blaauwkrantz	4·96
Gamtoos Station	1·99
Zoetendals Vallei	2·38

V. SOUTHERN KAROO:	
Triangle	1·95
Ladismith	2·17
Amalienstein	1·23
Calitzdorp	2·24
Oudtshoorn	0·68
Uniondale	1·11

VI. WEST CENTRAL KAROO:	
Prince Albert	0·33
Beaufort West (Gaol)	1·20
Dunedin	0·47
Nels Poort	0·92
Camfers Kraal	1·59
Krom River	0·85
Lemoenfontein	1·72
Willowmore	0·97
Rietfontein	0·70
Steytlerville	1·08

VII. EAST CENTRAL KAROO:	
Aberdeen (Gaol)	1·42
Aberdeen Road	0·81
Klipplaat	1·98
Kendrew (Holmes)	0·68
Graaff-Reinet (Gaol)	1·66
Do. (Eng. Yard)	1·26
New Bethesda	1·65
Roodebloem	1·09
Glen Harry	1·97
Wellwood	2·12
Bloemhof	1·63
Jansenville	1·71
Toegedacht	1·52
Klipfontein	2·26
Cranemere	1·60
Middlewater	0·88
Somerset East (Gaol)	2·03
Middleton	2·39
Spitzkop (Graaff-Reinet)	2·27
Villeria (Aberdeen)	0·97
Zeekoe River	1·01

VIII. NORTHERN KAROO:	
Calvinia	0·32
Sutherland	0·90
Fraserburg	0·47
Carnarvon	0·64
Brakfontein	0·60
Victoria West	0·66
Britstown	0·68
Wildebeestkooij	0·80
Murraysburg	1·13

VIII. NORTHERN KAROO (*contd.*):	*Inches*
Richmond	1·80
Hanover	1·02
Theefontein	1·91
Petrusville	0·93
The Willows (Middelburg)	1·73
Colesberg	1·37
Tafelberg Hall	1·67
Varkens Kop	2·68
Culmstock	2·74
Cradock (Gaol)	1·62
Witmoss	3·00
Maraisburg	2·23
Hillmoor	3·22
Tarkastad	1·22
Drummond Park	2·16
Schuilhoek	2·37
Vosburg	0·23
Zwavelfontein	0·25
Zoetvlei	1·94
Holwegkloof	3·63
Thebus Waters	2·54
Ruightersfontein	1·63
Klipkraal	1·57

IX. NORTHERN BORDER:	
Pella	0·10
Kenhardt	0·05
Upington	0·00
Van Wyks Vlei	0·14
Prieska	0·30
New Year's Kraal	0·00
Dunmurry	0·39
Karree Kloof	0·61
Douglas	0·58
Avoca (Herbert)	0·54
Hopetown	0·26
Newlands (Barkly West)	0·57
Barkly West	1·10
Kimberley (Gaol)	1·18
Strydenburg	0·54
Rietfontein (Gordonia)	0·60
Stoffkraal (Prieska)	0·00
Sunnyside (Hay)	0·33
Rocklands	0·61
Sydney-on-Vaal	0·69
Warrenton	0·87

X. SOUTH-EAST:	
Melrose (Division Bedford)	2·75
Dagga Boer	3·19
Lynedoch	3·41
Cheviot Fells	2·65
Bedford (Gaol)	5·31
Do. (Hall)	4·89
Sydney's Hope	3·52
Adelaide	2·86
Atherstone	3·38
Alexandria	1·90
Fort Fordyce	5·45
Grahamstown (Gaol)	3·47
Heatherton Towers	2·34
Fort Beaufort	3·43
Katberg	7·13

X. South-East (*continued*):	Inches.
Seymour	3·06
Glencairn	3·97
Lovedale	3·30
Port Alfred	1·52
Hogsback	6·84
Peddie	3·42
Exwell Park	2·02
Keiskamma Hoek	3·31
Cathcart (Gaol)	2·58
Cathcart (Forman)	2·36
Cathcart	2·82
Thaba N'doda	6·80
Evelyn Valley	13·71
Crawley	1·58
Pirie Forest	3·46
Isidenge	6·94
Kologha	6·46
Kingwilliamstown (Gaol)	2·26
Fort Cunynghame	9·05
Dohne	5·21
Kubusie	8·46
Quacu	5·30
Kei Road	1·60
Bolo	5·77
Fort Jackson	6·80
Prospect Farm (Komgha)	6·50
Komgha (Gaol)	7·09
Chiselhurst	4·88
East London West	2·84
Cata	8·88
Wolf Ridge	6·32
Dontsah	7·82
Mount Coke	5·15
Albert Vale (near Bedford)	2·93
Huxley Farm (Stutt.)	5·93
Thsileni (Kingwilliamstown)	5·85
Kingwilliamstown (Pym)	3·17
Eastover	3·12
Debe Nek	5·00
Middle Drift	2·73

XI. North-East:	Inches.
Venterstad	1·67
Mooifontein	1·93
Burghersdorp (Gaol)	2·40
Ellesmere	3·34
Lyndene	3·20
Brongton (Molteno)	1·50
Thibet Park	1·90
Sterkstroom (Station)	0·99
Rocklands	1·04

XI. North-East (*continued*):	Inches.
Aliwal North (Gaol)	1·58
Jamestown	1·57
Dordrecht	2·66
Herschel	2·72
Lady Grey	2·23
Lady Frere	1·73
Contest (near Bolotwa)	1·91
Keilands	2·58
Barkly East	1·76
Hughenden	3·78
Indwe (Collieries)	1·65
Stormberg Junction	3·12
Sunnymeade (Albert)	2·50
Clifton (Sterks.)	1·31
Edendale	2·05
Strydpoort (Dordrecht)	0·59
Avoca (Barkly East)	1·91
Philipdale (Albert)	2·65

XII. Kaffraria:	Inches.
Ida (Xalanga)	1·94
Slaate (Xalanga)	1·96
Cofimvaba	3·41
Tsomo	3·23
N'qamakwe	5·62
Main	1·93
Engcobo	5·94
Butterworth	6·99
Woodcliff	2·60
Kentani	7·99
Maclear	2·36
Maclear (Station)	2·73
Bazeya	6·67
Willowvale	9·75
Somerville (Tsolo)	2·64
Elliotdale	6·37
Umtata	3·90
Cwebe	6·93
Kokstad	4·43
Do. (The Willows)	5·40
Flagstaff	5·36
Insikeni	5·34
Port St. Johns	5·18
Umzimkulu	6·09
Do. (Strachan)	5·72
Lusikisiki	9·76
Dihota	6·42
N'dabakazi	6·68
Clarkebury (Engcobo)	3·64
Kilrush	6·77

NATAL.

	Inches.
Durban (Observatory)	15·33
Stanger	16·38
Verulam	27·28
Hillary	4·97
Winkel Spruit	4·50
Port Shepstone	8·05
Imbizana	7·61
Umzinto	13·68
Mid-Illovo	7·07
Bulwer	4·78
Himeville	8·61
Richmond	9·27
Pietermaritzburg (Asylum)	4·49
Do. (Burger Street)	7·32
Cedara (Vlei)	7·96
Howick	5·76

	Inches.		Inches.
New Hanover	6·25	Vryheid	8·35
Kranztkop	4·52	Paulpietersburg	4·60
Greytown	4·42	Ngomi Forest	9·56
Lidgetton	6·14	Ubombo	15·41
Nottingham Road	3·84	Nongoma	6·02
Estcourt	2·79	Hlabisa	10·05
Weenen	1·75	Mahlabatini	9·38
Mpofana	5·46	Melmoth	6·25
Ladysmith	3·98	Empangeni	9·65
Dundee	5·94	Mtunzini	10·62
Newcastle	5·41	Point	15·66
Utrecht	8·45		

TRANSVAAL.

	Inches.		Inches.
Barberton	4·55	Piet Retief	5·63
Komatipoort	2·97	Potchefstroom	1·34
Bethal	4·39	Klerksdorp	1·27
Bloemhof	1·43	Pretoria (Arcadia)	1·85
Christiana	2·06	Rustenburg	2·79
Carolina	4·64	Mbabane	5·87
Ermelo	2·99	Volksrust	4·44
Heidelberg	2·62	Potgietersrust	1·10
Vereeniging	2·13	Krugersdorp	2 56
Pilgrims Rest	3·39	Joubert Park	2·64
Belfast	4·58	Observatory	1·73
Zeerust	1·33	Pietersburg	3·08
Middelburg	3·14	Louis Trichardt	4·04

Agricultural Show Dates, 1912.

CAPE PROVINCE.

Paarl.—Thursday, 25th January.
Stellenbosch.—Thursday, 1st February.
Robertson.—Tuesday and Wednesday, 13th and 14th February.
Worcester.—Wednesday, 14th February.
Queenstown.—Tuesday and Wednesday, 20th and 21st February.
Beaufort West.—Thursday, 22nd February.
Malmesbury.—Thursday, 22nd February.
Barkly East.—Thursday and Friday, 22nd and 23rd February.
Rosebank.—Tuesday, Wednesday, Thursday, and Friday, 27th, 28th, 29th February, and 1st March.
Cathcart.—Wednesday, 28th February.
Graaff-Reinet.—Tuesday and Wednesday, 5th and 6th March.
Caledon.—Thursday and Friday, 7th and 8th March.
Middelburg.—Thursday, Friday, and Saturday, 7th, 8th, and 9th March.
East London.—Tuesday and Wednesday, 12th and 13th March.
Bredasdorp.—Wednesday, 13th March.
Bathurst.—Wednesday and Thursday, 13th and 14th March.
Cradock.—Wednesday and Thursday, 13th and 14th March.
Molteno.—Wednesday and Thurday, 13th and 14th March.
Oudtshoorn.—Wednesday and Thursday, 13th and 14th March.
Britstown.—Friday, 15th March.
Somerset East.—Friday and Saturday, 15th and 16th March.
Aliwal North.—Tuesday and Wednesday, 19th and 20th March.
Grahamstown.—Thursday and Friday, 21st and 22nd March.
Humansdorp.—Thursday and Friday, 21st and 22nd March.
Port Elizabeth.—Tuesday, Wednesday, Thursday, and Friday, 26th to 29th March.

TRANSVAAL PROVINCE.

Johannesburg.—Tuesday, Wednesday, and Thursday, 9th, 10th, and 11th April.

ORANGE FREE STATE PROVINCE.

Bloemfontein.—Tuesday, Wednesday, and Thursday, 16th, 17th, and 18th April.

Departmental Notices.

AT STUD, AGRICULTURAL SCHOOL, ELSENBURG.

That much-admired recently imported thoroughbred stallion "Whyte Melville" will serve this season a limited number of approved mares. "Whyte Melville", standing just over sixteen hands, a chestnut, bred by Lord Wolverton in 1905, is out of "Woodberry" and by the famous "Flying Fox", who was sold at the late Duke of Westminster's dispersal sale for 37,000 guineas, the highest price ever paid at public auction for a single animal, and who holds the record for the highest stud fee, which was 600 guineas. "Whyte Melville" won several important races in England.

Also stationed at Elsenburg is the pure-bred imported Catalonian Jack "Dom Pedro of Spain". "Dom Pedro" stands sixteen hands high, and will serve horse mares only.

To prevent disappointment, those wishing to secure the services of either should apply immediately to the Principal, Elsenburg, Mulder's Vlei, Cape Province, from whom any further particulars may be obtained.

G. N. WILLIAMS,
Acting Under-Secretary for Agriculture (Cape).

Department of Agriculture, Capetown,
8th November, 1911.

GROOTFONTEIN SCHOOL OF AGRICULTURE, MIDDELBURG, CAPE.

It is notified for general information that the next term for the admission of students to the above school commences on the 1st February, 1912.

Particulars of fees, curriculum, etc., may be had on application to the Principal.

Applications for admission must be received by the Principal of the School before the 5th January, 1912, and as there are only a limited number of vacancies, intending applicants are advised to arrange for enrolment as early as possible.

W. J. LAMONT,
Acting Principal, Grootfontein School of Agriculture.

Farm Employment.

Young man seeks employment on farm; Colonial born; 25 years of age. Experienced in fruit farming, and can work with cattle, horses, and mules. Speaks both English and Dutch. Strong, healthy, sober; testimonials.—G. J. ROSSOUW, jun., Rose Street, Wellington, Cape Province. [10]

Applicant, 22 years of age, desires position as manager or under manager on farm. Two years at Elsenburg Agricultural College; testimonials.—D. WOODHEAD, "Cottesbrook", Kroomie, Cape Province. [10]

Applicant seeks managership of farm. Life experience in lucerne cultivation, ostrich, sheep, and cattle farming, and agriculture. Has managed farms in Cape Province, Orange Free State, and Transvaal. Married. Testimonials.—GEO. J. HITGE, Greystones Farm, P.O. Val Station, District Standerton, Transvaal. [11]

Young man seeks employment on a farm; age 21; South African born; used to farm work, and has had two years' experience in mixed farming; speaks English and Dutch. [12]

A young man, strong and healthy, 17 years of age, seeks employment on a large progressive farm as an improver with a view of getting a sound practical knowledge of farming. Advertiser speaks both English and Dutch and has had practical experience as a farm hand for six months.—Apply FARMER, P.O. Box 87, Pretoria. [12]